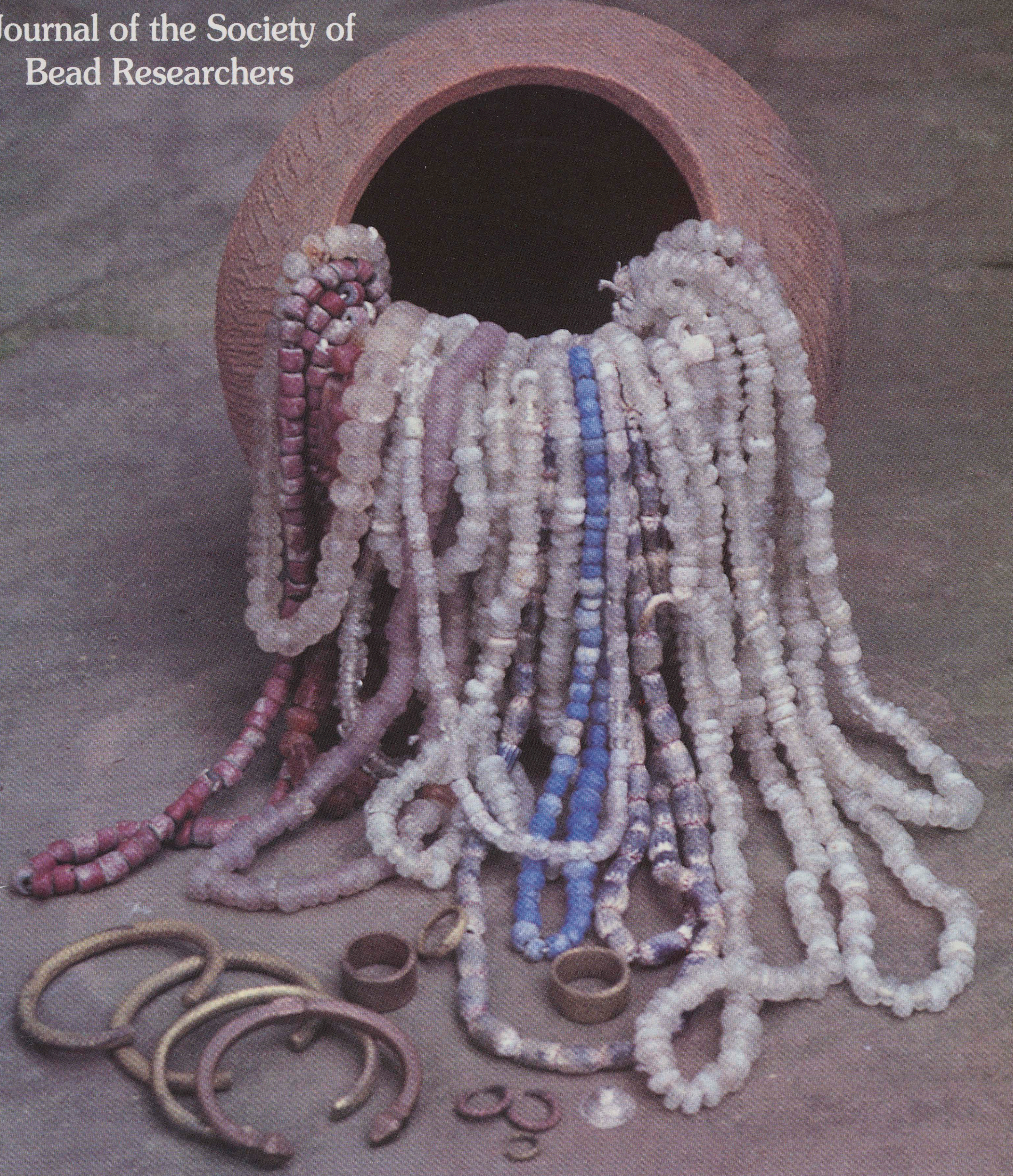
Beads: Journal of the Society of Bead Researchers - Volume 1 (complete)

BEADS

Journal of the Society of Bead Researchers



1989 Vol. 1

Diakhité Burial Vessel

The Society of Bead Researchers

BEADS (ISSN: 0843-5499) is published annually by the Society of Bead Researchers, a non-profit, scientific-educational organization which aims to foster serious research on beads of all materials and periods, and to expedite the dissemination of the resultant knowledge. Subscription is by membership in the Society. Membership is open to all persons involved in the study of beads, as well as those interested in keeping abreast of current trends in bead research.

There are three levels of membership: Individual - $10.00; Sustaining - $25.00; and Patron - $50.00 (U.S. funds). All three levels receive the same publications and benefits. The Sustaining and Patron categories are simply intended to allow persons who are in a position to donate larger amounts to the Society to do so. Members receive the annual journal, *Beads,* as well as the biannual newsletter, *The Bead Forum.*

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Information for authors is provided at the back of the journal.

Cover. *Diakhité:* The larger funerary pot and its contents (photos by H. Opper).

Back Cover. *Diakhité:* Strands of glass and carnelian beads, strung as found, from the larger funerary pot.

BEADS

1989 Vol. 1

Journal of the Society of Bead Researchers

KARLIS KARKLINS, editor

CONTENTS

BOOK REVIEWS

NOTE: This reprint of *Beads* volume 1 is identical to the original version with a few exceptions. Pages 67 and 70 have been refurbished to put Table 2 in its proper place. Several inconsistencies in table headings and scattered typographical errors have also been corrected, and a line of text that the computer opted to delete from the bottom of page 89 in the initial printing has been reinstated. All the color plates had to be redone as the color separations for the initial ones were no longer usable. This allowed captions to be added to the plates, and the color is much improved overall.

In the reports that follow, reference is made to the beads illustrated in the color plates by plate number (Pl.), row (R.) and row position (#). For example, the designation Pl. IA, R.2, #3 refers to the third bead in row 2 of Plate IA.

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THE EDITOR'S PAGE

Beads have been popular forms of adornment since our ancestors lived in caves and have been used in one form or another by practically every ethnic group on the face of the earth since then. Despite this near-universal popularity, it was not until the late 1960s that research on these amazingly-diversified baubles began to blossom. In the decade that followed, Robert K. Liu initiated *The Bead Journal*, bead enthusiasts in Los Angeles formed The Bead Society (the first of its kind), and ever-increasing numbers of researchers, both avocational and professional, turned their attention to the study of beads. Their energies were primarily directed at formulating bead chronologies and classification systems, as well as determining bead production techniques, uses, trade values, chemical composition and origins.

With so much research going on all over the globe, there became a definite need for an informal organization that would reduce the isolationism of those studying beads and expedite rapid communication between researchers. The untimely demise of *The Bead Journal* in 1978 accentuated this need and spurred Peter Francis, Jr., to form the Society of Bead Researchers in 1981 with the help of Elizabeth J. Harris and Jamey D. Allen. The Society's mandate was straightforward: to promote the scientific study of beads. To help accomplish this goal, Peter initiated *The Bead Forum*, an informal newsletter through whose pages researchers could seek and share information.

Your present editor came on the scene in 1983 with the hope that the Society — then with a membership of 11 dedicated souls — could one day fund a scholarly journal devoted entirely to the study of beads, one with much-needed color illustrations. As you can see, that day is here!

The articles that appear on the following pages represent a cross-section of what is currently being studied in the United States, the Caribbean and Africa. The article by Chris DeCorse is especially timely as bead research in Africa is only now reemerging after a hiatus of some 25 years; a hiatus that is apparently responsible for the actions of at least one archaeologist working in East Africa who is not even saving — much less studying — the beads found in his excavations! That this sort of thinking exists in this day and age is deplorable.

I hope that you will find this first issue of *Beads* interesting and informative. If so, please tell your friends and colleagues about it and urge them to join the Society of Bead Researchers. If not, let me know what can be done to improve it. I would also be interested to learn what areas of bead research you think should be investigated futher, and which publications should be reviewed in future issues. This journal cannot be a success without your input and support.

I am very grateful to all those who submitted manuscripts and book reviews for this issue, and to those who read and commented on them. I would also like to thank all of you who have supported the Society over the years, both financially and with contributions to *The Bead Forum*. We could not have made it this far without your help.

Karlis Karklins

DIAKHITÉ: A STUDY OF THE BEADS FROM AN 18TH-19TH-CENTURY BURIAL SITE IN SENEGAL, WEST AFRICA

Marie-José Opper and Howard Opper

It is the intention of this paper to place the Diakhité beads into a historical and archaeological perspective, and by so doing examine a period in Senegambian history that roughly extends from the 18th century to around the middle of the 19th century. The beads serve as a focal point to describe the trade that brought them from Europe and elsewhere to Senegambia. They also help portray some aspects of the lives of a particular ethnic group which inhabited the Thiès area during this period — the Serer Nones.

INTRODUCTION

The Diakhité sand pit is situated northeast of the relatively large town of Thiès, some 70 km east of Dakar, the coastal capital of Senegal, West Africa (Fig. 1). The "plateau" of Thiès disappears under sand formations in this area which represent the continuation of a vast system of dunes covering the whole area and extending north across the Senegal River into Mauritania.

In operation for the past fifty years or so, Diakhité came to the attention of archaeologists in 1941, when R. Mauny discovered archaeological material in a sand/clay level dating to the neolithic period, indicating that the site has been an important living area for man since prehistoric times (Lame 1982:2). Even today, individual garden plots thrive in the rich yet fragile soil once the overlying sand layer (which reaches over 5 m in depth where it is being excavated) is removed. Water is still plentiful and close to the soil's surface.

Within the last five years, workers at the sand pit have uncovered many thousands of beads, which they claim to find primarily in clay pots or near the shards of broken pots. Along with the glass, stone, amber and shell beads, they have also exposed numerous rings, bracelets and earrings made of brass and copper. The workers also claim to have found skeletal remains that "fall apart" when touched, suggesting that the area once served as a burial ground.

The artifacts are situated about one meter below the surface where graves have been discovered. Unfortunately, we were unable to observe an untouched grave, and only two intact pots were recovered, one with its contents held in place by dried sand.

We were unable to observe and inventory all of the beads and other artifacts recovered from the site during numerous visits there from 1986-88. Aside from a small quantity of artifacts sold by the workers, we were able to inventory everything the men pulled from the sand pit. We feel confident that the types and quantities of artifacts reported in this study are accurate enough to provide a valid representation of the beads and other adornments worn in past centuries by the indigenous population.

THE STATE OF TRADE

The perception of trade in "gewgaws" to precolonial Africa is similar to that long held for North America during the same period in that it conjures up an image of the noble savage duped by European powers into accepting cheap or dangerous wares such as beads, liquor and firearms in exchange for articles of noteworthy value in their own countries (Curtin 1975: 309). Despite the fact that this notion is not altogether inappropriate, the state of trade prior to the colonization of Senegal by the French in the mid-19th century was much more sophisticated than this simplified idea suggests. In fact, to a very large extent it was

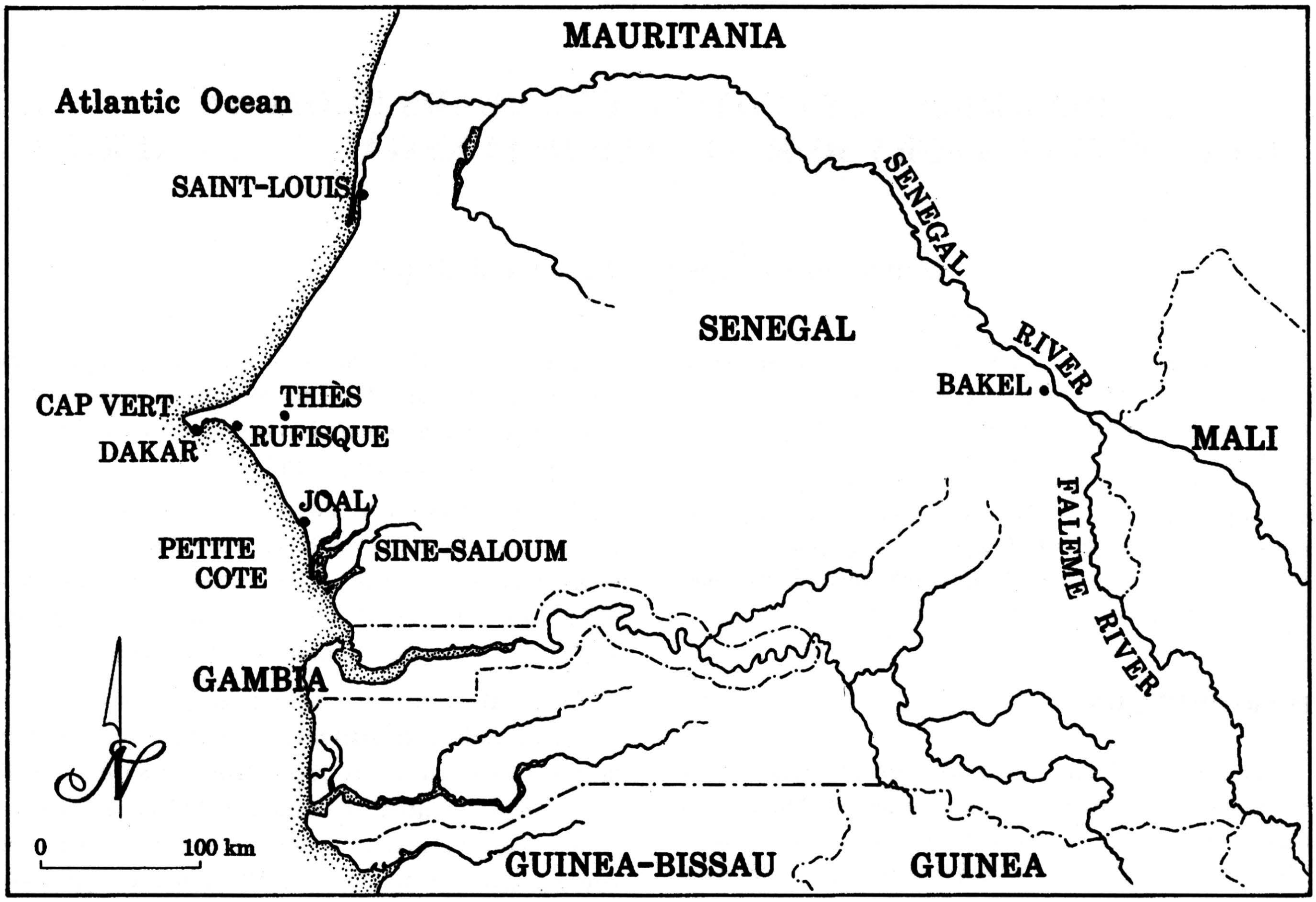

Figure 1. Map of Senegambia showing the location of Thiès, near which lies the Diakhité burial ground (drawing by D. Kappler).

the demand created by ever changing tastes and desires within Africa and *not* what the trading powers determined to be tradeworthy that decided which goods would be imported and well received (Curtin 1975: 314).

External trade in the Senegambia region existed well before the arrival of the Europeans. The Ghana Empire, which fourished from the 8th to the 11th centuries and was located in what is now northern Senegal, southern Mauritania and western Mali, established caravan trade routes which linked it to North Africa and the Middle East. Even at that time beads figured as a major import. As was the case then, the European trading powers of the precolonial period were also lured to the area chiefly for the gold being found further south along the Falémé River.

Until the 17th century, Spain and Portugal were the powers to be reckoned with in the overseas trade, with the Portuguese holding influence over coastal Senegambia. The Dutch became very active in the region shortly after 1600, and had replaced the Portuguese by the 1670s. The English and French, in turn, sought to expel the Dutch, and, from the 1690s to the 1710s, the English joined forces with the Hollanders to remove the French from the picture (Curtin 1975: 102). When the French and English finally established themselves firmly in the Senegambia later on in the century, they found that some commodities (including certain beads) introduced by the Dutch and Portuguese were still popular.

Within precolonial Senegambia, enormous amounts of foodstuffs such as millet, meat, fish and salt were traded between different geographic zones to satisfy local tastes or alleviate shortages. Although little documentation concerning this well-established trade pattern exists, the Europeans did keep good records of commodities acquired for the European market. "Captives" were easily the most important commercial export, especially in the late 17th and 18th centuries. Even though the gold trade never did match up to its anticipated potential, Europeans in general were more interested in it than in the slave trade (Curtin 1975: 198). Other major exports to Europe included iron (which became an import later on), cotton textiles, gum, cattle and hides, beeswax and salt (Curtin 1975: 197-228).

Probably as a direct cause of the area's growing need for iron and its dwindling supplies, a currency system was established by the trading powers utilizing this important metal. By the middle of the 17th century, the "bar" had become the standard for trade, one bar being a section of flat wrought iron 3 m long, 5 cm wide, and 9 mm thick. It was frequently cut up into pieces about 20 cm in length that were suitable for manufacturing a hoe blade. (Curtin 1975: 241)

Curtin (1975: 242) provides the following relative values for several categories of beads:

Amber:	8 bars per lb. for large stones, shifting to .5 bar per stone in 1728
Glass beads:	.5 bar per lb.
Crystal:	10 bars per 1,000 after the 1720s
Carnelian:	5 bars per 100 after 1718
Cowries:	.33 bar per lb. in 1666, becoming a stable .5 bar per lb. from at least 1683 onward

Sophisticated external trade had been practiced for many centuries in Senegambia, causing fierce commercial competition among the European trading powers ultimately bent on colonizing the area. The tastes of the Senegambian peoples, which continue to vary greatly, presented a challenge to foreign merchants whose wares were not always desired or in demand.

BEADS IN THE TRADE

Common European glass beads were very inexpensive, the price varying from £80 to £120 per metric ton. These were traded by the "mass," one of which was composed of twelve "branches" which were further divided into ten "strings" (Curtin 1975: 317-319).

Not all beads imported into Senegambia and the rest of West Africa were the inexpensive kind. Examples of four different time-honored and costly beads appear at Diakhité: carnelian, cut crystal, coral and amber. Carnelian, called *cornaline* in French and *arrangoes* in Gambian English, were purchased in Europe for up to £.43 per piece at the beginning of the 18th century. Cut crystal was also expensive, ranging from £1.50 to £2 per thousand for better quality stones. Coral was clearly luxury-class material, costing between £5 and £10 per kilogram (Curtin 1975: 319). Although only a small number of amber beads were found at Diakhité, they did figure prominently in the trade for a relatively short period of time and were also among the most expensive of trade articles (Curtin 1975: 242).

Certain French documents, including ships' manifests and inventories, have proved to be extremely instructive in looking at beads in the precolonial trade of Senegambia. For example, a 1678 trading voyage to the west coast of Africa led by Jean Barbot representing the Compagnie du Sénégal aboard the *Soleil d'Afrique* ("African Sun") carried three barrels of *rassade* or simply *rasse*, French words orginating from the Italian verb *rassare*, meaning to shine (Dictionnaire Paul Robert 1874). They were broken into packets, masses or branches for retailing, and the colors mentioned are blue, white, yellow, green, red, and gray-white. It is interesting to note that Barbot goes on to describe *rassade* as being melted down by Africans in order to create desired sizes and forms. These beads were traded for ivory, gold, slaves, and also served as payment for services rendered (Debien, Delafosse and Thilmans 1978: 245-246). *Contrequarbé*, another common bead exported by the French, appeared aboard the *Soleil d'Afrique* in two colors: yellow and black. They, too, were used in trade for ivory and gold. Also mentioned are *margriettes*, large transparent glass beads of various colors made in Venice. Barbot lamented the fact that he was unable to obtain either *margriettes* or cowries before sailing, as they were highly prized trade articles (Debien, Delafosse and Thilmans 1978: 385).

During a trading expedition in 1724, along the Senegal River less than 200 km north of Thiès, the total value of merchandise carried by the traders was £14,299. The total value of the beads carried was £1,324 (Delcourt 1952: 382), representing about 9.5% of the total cargo value. According to Delcourt (1952: 382-386), the following beads figured in the trade:

1) For 180,000 lbs. of gum, paid £6,369 of which 3 lbs. of yellow amber was included valued at £144.
2) For 50 "captifs," paid £2,259 of which:
   8 "cords" (strings) round carnelian @ £48
   12,000 *galet rouge* @ £48
   5 oz. average amber @ £10
   9 cords of fake (glass) faceted amber @ £38
3) For 131 cattle, paid £884 of which:
   12,000 *galet rouge* @ £48
   2 cords of fake (glass) faceted amber @ £8
4) For 120 hides, paid £100 of which:
   20,000 *galet rouge* @ £80

From the same source, the following list shows prices for specific beads, circa 1724:

Large yellow amber	48£/lb.
Medium amber	2£/oz.
Galet rouge	4£/1,000
Fake faceted amber	I£/cord
Pezant vert	4£/1,000
"Round" carnelian	6£/cord
Fine coral	12£/oz.
Margriettes	1£/cord
Yellow glass	2£/lb.

From 1740-41, the British Royal African Company paid with a "bundle" consisting of some 24 different commodities for 180 slaves. Weighing 11,476 kg, a bundle contained the following beads: 15,195 stones of carnelian weighing 30 kg, 1,996 kg of glass beads, and 60,700 stones of faceted crystal weighing 131 kg (Curtin 1975: 172). Thus, some 2,157 kg or 18.8% of the total weight of a bundle consisted of beads. Further extrapolation of the figures shows that 64 kg of goods were traded for each slave, of which 12 kg were beads. Interesting but sad testimony to the perceived value of a human life.

The French National Archives (Colonies C6, 14) offer a rather comprehensive look at the various beads inventoried at the trading concession on Gorée Island. In 1754, the inventory was divided into three categories which were based on the popularity of beads at the time. Among those glass beads considered currently in style and essential to the trade were fake crystal, "snow-white" beads, *contrebordé* with flower designs, beads "painted" golden or with white arabesques, oval beads with white lines, faceted blue *loquis, rassade,* and various "common" glass beads, especially red ones. Beads at the concession which were no longer in style (thus worth less) were accepted by obliging merchants in partial payment for goods or given out by them as payment for services rendered. Included in this category were "gold gilted" *contrebordé*, long carnelians, crystal, striped *galets,* "common" *loquis,* starry and striped *margriettes*, and red ovals with flower designs. In the third and final category, the archives indicate projected needs for the coming year by listing beads to be ordered: round average yellow amber, coral, carnelian, faceted blue *loquis, galet rouge*, red and blue *contrebordé* with yellow and white flower designs, respectively, and large clear "common" glass beads (Colonies C6, 14).

Among articles of trade listed in a 1784-85 manifest entitled "Cargo of a 120 ton ship destined for the gum trade along the Senegal River" were the following beads (Labarthe 1802: 183-184):

Red and white *galet*	600 lbs.
"Fake" coral	150 masses
Red, white, black and yellow *rassade*	600 lbs.
Coral, no. 2 and 3	10 lbs.
Black, yellow, red and clear *charlotte*	150 masses
Fine amber, no. 3 and 4	25 lbs.
"Fake" amber, no. 2 and 3	25 lbs.

Labarthe (1802: 98) indicates that the price of one slave in 1784 was 130 bars, or £650, one bar being worth £5. Among the goods that made up the 130-bar total were three branches of amber and three pounds of coral. From the slave trade in 1789, he points out several specific beads used as payment: opaque amber traded by the branch, coral, red and white *galet,* blue *loquis* with diamond-shaped facets, faceted crystal by the cord (string), blue and red *contrebordé*, and white and yellow oval glass beads by the mass (Labarthe 1802: 227-228).

The amount of beads imported into Senegambia declined as the West African trade developed and new goods were introduced. In fact, looking at the percentage of total imports during the precolonial period in Senegambia, a marked decrease can be observed: from 39.9% of total imports in the 1680s, beads dropped to 18.0% in the 1730s, and then to 8.8% in the 1830s (Curtin 1975: 318). Once again, shifting demand compelled traders to modify their stock: "changes between the... periods are nevertheless significant — a continued fall in raw iron, a rise in silver and firearms, and a shift of luxury exports from beads to textiles" (Curtin 1975: 312).

Beads, nonetheless, continued as important elements in the trade, as revealed by the following passage written by the Frenchman Abbot Demanet during a voyage to Senegambia in 1763-64:

> Beads of all types are the merchandise which works best for the traders, and that which brings them the biggest profits: consequently, they must give out as much as is demanded. Without beads the colony could not exist because without them it would not be able to acquire food and other articles necessary to life which the country provides. It is inconceivable for inexperienced Europeans to imagine how many beads are consumed along all the coasts of Africa. Men and women alike wear prodigious belts of them, which are sometimes one foot wide by three or four rows thick. The finer beads are for those who are wealthy; the common ones are for their slaves. A woman would not consider herself dressed if she didn't have a certain number of sufficient necklaces and belts of coral, amber, loquis, galets, carnelian and crystal beads, and gold ear pendants which they make themselves (Walckenaer 1842, Tome V: 182).

OF THIÈS AND THE SERER NONES

In order to illustrate the life and times of the people who utilized the Diakhité burial ground, it will be beneficial to take a brief look at the Thiès region prior to the period of French colonization and the specific ethnic group which lived there: the Serer Nones.

A map of Senegambia dated 1751 shows a town called Kamina which is situated very close to, if not in, present-day Thiès (Curtin 1975: 97). Trade routes shown on the map place Kamina along the east-west route joining the Portuguese settlement at Rufisque, a port-town located less than 20 km east of Dakar, with the interior. The town is also placed at the southernmost point of the major north-south route connecting Saint-Louis and the lower Senegal River with Rufisque to the west. As early as the 17th century, Kamina served the Portuguese as a kind of "market enclave" situated along the frontier of two regions under different local control. It was "a major center for buying textiles and hides, and a way-point on the important trade route leading eastward" (Curtin 1975: 99).

The strategic location of Thiès did not escape the French in the middle of the 19th century during the initial period of colonization of Senegal. The period 1861-65 is referred to as the "era of pacification" by the French during which the military cleared out small pockets of resistance and established their own form of law and order which made the area secure for further exploration. The opening of the rail line in 1885 joining Dakar with Saint-Louis clinched the importance of the town as a major relay point between the two cities (Savonnet 1955: 174). The period at Diakhité with which we are concerned ends around the time the French began to pacify the region.

Little is known about the origins of the Serer ethnic group to which the Serer Nones are presumed to be related. They are, however, acknowledged to have inhabited the same areas in the Thiès and Sine-Saloum regions longer than any other group in Senegal, with the exception of the Casamance region south of the Gambia. Based on similar oral traditions and current associations with the Toucoulour and Peul ethnic groups, it is highly possible that they all occupied areas of the Senegal River valley and possibly north into present-day Mauritania. They are presumed to have migrated south sometime during the downfall of the medieval-period Ghana Empire, around the 11th and 12th centuries. Those who remained independent and were not absorbed by the dominating Wolof (who to this day hold the political and economic power in Senegal) finally settled what was then forested country south (Sine-Saloum) and east (Thiès) of Cap Vert (U.S. Government Printing Office 1974: 68-69). Actually, the historical place of the Nones within the Serer family which comprises some five separate groups is somewhat obscure as witnessed by the fact that they stand apart linguistically from the others.

Beads in the area are mentioned as early as 1635, in the description of the death of a married woman who lived in the region of Thiès. In a testament she made before dying, she bequeathed her coral, crystal and "other objects of adornment" to the friends she liked best. About the same time, the men of the region were not at all timid about approaching the Portuguese or French and asking them for coral, crystal and other wearable objects for their wives (Walckenaer 1842, Tome II: 318).

In 1697, André Brüe, then governor of the *Compagnie du Sénégal, Cap Nord et Cote d'Afrique*, described at length his observations of the Serer ethnic group:

> These Serers, who are found principally around Cap Vert are a free and independent nation which has never acknowledged a soverein. They form, within their boundaries, many small republics where they have no other laws than those of Nature. They eat a large number of animals. This author believes that most of them have no concept of a supreme being, believing that the spirit perishes with the body. They are completely naked. They have no commercial links with the other groups. If they receive an insult, they never forget it. Their hatred is handed down to their descendents, and sooner or later it produces a vigorous vengeance. Their neighbors treat them as savages and barbarians. It is an outrage to give the name Serer to another Negro. However, this nation is simple, honest, gentle, generous, and very charitable toward strangers. They do not use strong liquor. Serers bury their dead away from their villages, in round huts which are as well constructed as those in which they actually live. After placing the body on a sort of bed, they block the entrance of the hut with sodden earth which they continue to use as a plaster to cover the reeds which serve as walls, to a thickness of one foot. The edifice terminates in a point, giving the burial grounds the appearance of a second village, and the tombs of the dead are more numerous than the houses of the living. As Serers have no industry to make inscriptions or other marks on these monuments, they content themselves by placing on the summit a bow and some spear points on those of men and a mortar with pestle on those of women. The first marks the occupation of men, which is almost uniquely hunting, and the other that of women, whose continual work is to pound rice or corn. There are no Negros who cultivate their land with as much competence as the Serers. If their neighbors treat them as savages, they are much better off in regarding other Negros as madmen who would rather live in misery and suffer hunger than work to their own betterment (Walckenaer 1842, Tome II: 392).

A somewhat different picture of Serer burial rites emerges from an 1814 description which indicate that only the thatch roof of the hut projects from the ground. It is covered with earth, forming a kind of mound. Within the tomb, care is taken to place a pipe, tobacco, a water jar and a bowl half full of food (couscous) at the feet of the deceased. In this version, it is believed that the soul lives on for a given amount of time near its old habitat before finally inhabiting another body (R.G.V. 1814: 127). An engraved depiction of Serer tombs in this work shows thatched roofs covering a large area of ground with a mortar and pestle mounted on top for women, and a bow and arrow for men.

From the documents of l'Institut Fondamental d'Afrique Noire (IFAN) in Dakar comes a somewhat different description of Serer burial customs in which a deep pit is excavated to receive the body which is accompanied by a tobacco pouch and a live rooster. The body is then laid on a bed placed in the pit which is filled in and then covered by the hut that belonged to the person being buried. In older times, precious objects such as bracelets, beads and pottery were buried with the body, but this custom is rarely practiced today and then only in complete secrecy (Documentation IFAN n.d.: XIII-3, no.71).

Brüe's previously-mentioned 17th-century portrayal of Serers is echoed almost one hundred years later by a French naval officer. He identifies the Serer people as the original inhabitants of the area, and describes them as living independently, cultivating only that amount of land necessary to sustain them. "They have a language particular to them, they flee other people, do very little external trading and go around almost totally naked" (Labarthe 1802: 110).

DESCRIPTIVE INVENTORY OF THE DIAKHITÉ BEADS AND ASSOCIATED ADORNMENTS

Approximately 13,500 beads were recovered from the Diakhité sand pit between 1986 and 1988. Materials include rock crystal, carnelian, amber, shell, copper alloy, and glass. The glass specimens are classified using the system devised by Kenneth and Martha Kidd (1970) as expanded by Karklins (1985). Bead classes I-IV are of drawn manufacture; those with a W prefix are wound. Complex bead shapes are identified using the terminology provided by Beck (1928) and van der Sleen (1967).

Plate IA: Stone, Shell and Metal Beads

Row 1: Rock crystal (quartz); 1,195 specimens.

The vast majority of the specimens are oblate, exhibiting pentagonal facets around the middle. Depending on size, the average number of facets is 24-32. The beads range from 4.8-12.2 mm in length and 7.1-18.3 mm in diameter. In almost all cases, one end is relatively flat, while the other shows a concave depression. Extensive battering and abrasion of the ends and facets reveal that these beads were worn strung together. Another 17 beads display spiral faceting and are among the largest of the oblate-shaped specimens. Eight others are barrel-shaped, the length ranging from 11.9-19.8 mm and the diameter from 8.5-12.6 mm.

Rows 2-3 and row 4, no. 1: Carnelian; 343 specimens.

Six distinct forms are representated:

1) Long hexagonal prism (row 2, no. 1); 63 specimens. Length: 19.8-39.1 mm; diameter: 6.4-13.3 mm.
2) Long tapered hexagonal prism (row 2, no. 2); 25 specimens. The longest specimen measures 37.2 mm with a diameter of 13.1 mm at one end tapering to 8.1 mm at the other.
3) Lozenge (row 3, no. 1); 7 specimens. Length: 11.9-16.3 mm; diameter: 7.7-13.2 mm.
4) Standard and short truncated bicones (row 3, nos. 2 & 3); 242 specimens. Four to six facets on each side of the equator. Crude faceting and overall non-uniform manufacturing technique. Ends of no. 3 in row 3 are flattened closer to the equator than no. 2 in the same row. It is interesting to note that the flatter specimen resembles a form found in tumuli dating to the 14th century in Senegal, the distinction being that the older form displays eight facets on either side of the equator, and the equator itself is also faceted (Mauny 1950: 76). Length: 6.2-14.3 mm; diameter: 8.1-14.9 mm.
5) Octagonal prism (row 3, no. 4); 4 specimens. Drilled from either end, the perforations show great wear and battering. These beads were probably taken from centuries-old burial sites somewhere in Senegal which somehow found their way to Diakhité. Taking beads from such burial sites has been practiced in Senegal and throughout West Africa for a very long time. Length: 14.0-19.9 mm; diameter: 11.5-15.6 mm.
6) Long truncated octagonal bicone (row 4, no. 1); 2 specimens. The hole is drilled from both ends. Same as the octagonal prisms; it is most likely that these beads were recovered from ancient tombs. Longest bead is 36.8 mm with 11.6 mm diameter at the equator, tapering to 9.3 mm at the ends.

Row 4, nos. 2-3: Amber; 5 specimens.

The specimens are oblate and have a deep red-brown patina covering the originally transparent to translucent amber. Length: 4.7-12.2 mm; diameter: 9.1-13.3 mm.

Row 5: Shell; 76 specimens.

1) *Conus* (no. 1); 1 specimen. The largest of the shell beads, it is 32.8 mm in diameter.
2) *Arca senilis* (no. 2, top); 2 specimens. Similar beads were found by us at protohistoric and prehistoric sites near Nouakchott, Mauritania.
3) Cowrie (no. 2, bottom); 76 specimens. Unlike the other shell beads from Diakhité, the cowrie beads were not of local manufacture. They are still found in large quantities at markets in Senegal. Average length: 18 mm.
4) Unidentified shell (no. 3, top and bottom); 7 specimens. Lasnet (1900: 141) illustrates a young Serer woman wearing this triangular-shaped shell bead strung through a strand of hair suspended over the forehead. These locally manufactured beads are still found at Senegalese markets.
5) Two large shell beads/pendants with etched designs, reported to us in 1989; 2 specimens (not illustrated).

Row 6: Metal; 2 specimens.

1) Round copper-alloy bead with gold foil overlay (no. 1); 1 specimen. Length: 12.9 mm; diameter: 18.4 mm.

2) Flat brass pendant with stamped design (no. 2); 1 specimen.

Plate IB: Glass Beads

Rows 1 and 2: Type IIIk "chevron" beads; 189 specimens.

The most numerous chevron beads from Diakhité are typical four-layered faceted barrels. The colors of the four starry layers from the exterior inward are: translucent (tsl.) bright navy, opaque (op.) white, op. redwood, and op. white. In many of these beads, the rays are deformed, creating a "hurricane" pattern. Six flat facets are ground at the ends to enhance the chevron pattern. The ends are flat, and on many beads the outer layer is very eroded.

Two seven-layered chevrons (row 1, nos. 1 & 4) were also recovered. They are both standard-barrel shapes; one large, the other small. These have the transparent core typical of the earliest types. These small seven-layered chevrons are still seen in the markets of Senegal and Mauritania and are considered expensive luxury items.

The collection also contains one four-layered barrel-shaped chevron with a brick-red exterior, and another one with a "black" outer layer (row 1, nos. 2 & 3), as well as four unfaceted short-barrel forms (row 2, nos. 1 & 2). The latter were reheated in order to make them round (Jamey D. Allen 1989: pers. comm.). Several short barrel-shaped beads (oblate with flat ends), as well as a small number of long-faceted bar- rels, have five layers (row 2, no. 3): tsl. bright navy/op. white/op. redwood/op. white/tsl. bright navy. On one example, the two inner-most layers are reversed.

Row 3: Decorated wound beads.

1) WIIIb; round; op. black body; one spiral stripe composed of op. white and tsp. ruby filaments twisted together (most of the red glass has disintegrated), and one spiral stripe f aventurine; 2 specimens.
2) WIIIb; round; op. white body; a thin op. apple green stripe on a broad wavy stripe of aventurine encircles the equator; 3 op. ruby flower patterns are situated on either side of the equator; 1 specimen.
3) WIIIb; round; op. black body; combed design of alternating op. white and aventurine; distinctly flattened ends; 12 specimens.
4) WIIIb; round; tsl. bright navy body; op. white floral wreath encircling equator; distinctly flattened ends; 34 specimens.
5) WIIIb; round; tsl. surf green body; op. white floral wreath encircling equator; flattened ends; decomposed condition; 3 specimens.
6) WIIIb; oval; tsl. bright navy body; op. white floral wreath encircling equator; flattened ends; 7 specimens.
7) WIIIb; round; tsp. ruby body; op. lemon yellow floral wreath encircling equator. Most examples are heavily patinated and the wreaths have turned white; flattened ends; 9 specimens.

Row 4: Decorated wound beads.

Nos. 1-6: Type WIIIb "eye" beads with simple or compound dots.

1) Round; op. white body; 12 compound eyes of op. mustard tan on op. robin's egg blue; 1 specimen.
2) Round; op. surf green body; 15 compound eyes of tsp. ultramarine on op. white; 2 specimens.
3) Round; op. black body; 36 compound eyes of tsp. ruby and op. bright blue on op. white or tsp. ruby on op. white or op. bright blue on op. white (schemes vary); 19 specimens. Similar varieties (not illustrated) exhibit 15 eyes (7 specimens) and 9 eyes (2 specimens), respectively.
4) Round; op. black body; 51 compound eyes (most of them run together) of op. turquoise green or tsp. ruby on op. white; 5 specimens.
5) Round; tsl. light gray body; 15 compound eyes: the five around the equator are tsp. ruby on op. white, while those around the ends are tsp. bright navy on op. white; 1 specimen.
6) Round; op. white body; 21 tsp. bright navy eyes; 1 specimen.
7) WIIIb; oval; op. white body; 4 tsp. bright navy floral wreaths parallel to the perforation; 1 specimen.

Row 5: Decorated drawn and wound beads.

1) IIb; barrel-shaped; tsl. ultramarine body with 26 op. white stripes; 6 specimens.
2) IIb; barrel-shaped; op. black body with 8 op. white stripes; 2 specimens.

3) IIb; round; tsp. aqua blue body with 6 alternating op. white and op. redwood stripes; 7 specimens.
4) WIIIb; round; tsp. aqua blue body with 12 op. white eyes; distinctly flattened ends; 1 specimen.
5) WIIIb; round; tsp. aqua blue body with 9 eyes; the three around the equator are op. white, while those around either end are op. mustard tan on op. white; 1 specimen.
6) Ib; tubular; tsp. light surf green body with an average of 17 op. white stripes; "gooseberry" beads; 52 specimens.
7) IIb; barrel-shaped; tsp. colorless body with 8 tsl. white stripes; 1 specimen.

Row 6: Faceted and striped drawn beads.

1-4) If; elongate multi-faceted beads with flattened ends. There are four varieties:
 a) tsp. palm green; 38 facets; 1 specimen.
 b) tsp. ultramarine; 40 facets; 2 specimens.
 c) tsp. amber; 36 facets; 1 specimen.
 d) op. cobalt blue; 45 facets; 1 specimen.
5) IIb; oval; tsp. colorless body with 7 op. white curved stripes; 1 specimen.

Row 7, nos. 1-6: Type If and IIIf multi-faceted beads.

These consist of hexagonal to octagonal tube segments with a facet cut on each corner.

1) If; tubular, cornerless heptagonal; tsp. colorless; 21 facets; ends distinctly flattened; 67 specimens.
2) If; tubular, cornerless heptagonal; tsp. light gray; 18 facets; distinctly flattened ends; 256 specimens.
3) IIIf; tubular, cornerless octagonal; tsp. light gray outer layer; tsl. oyster white middle layer (glass is opalescent); tsp. light gray core; 40 facets; ends flattened; 9 specimens.
4) IIIf; tubular, cornerless heptagonal; op. bright Dutch blue outer layer; op. copen blue core; 21 facets; ends distinctly flattened; slightly dull surface; 179 specimens.
5) If; similar in all respects to the preceding bead, except that this one is monochrome bright Dutch blue; 97 specimens.
6) IIIf; similar to no. 4 but the colors are a bit "deeper;" 1 specimen.
7) WIIIb; op. black body with op. white undulating lines; 2 specimens.

Row 8: Ruby-colored wound beads; 17 specimens.

Nos. 1 and 3-8 belong to the style called "cornaline d'Aleppo." The outer layer is often pitted and covered with a white patina. In many cases the core is almost completely decomposed.

1) WIIIa; round; tsp. ruby outer layer; op. light yellow core.
2) WIb; round; tsp. ruby.
3-8) WIIIa; round, oval and cylindrical; tsp. ruby over op. white.

Row 9: Assorted wound and drawn beads.

1) WII; hexagonal truncated bicone; tsp. light gray; 1 specimen.
2) WII; hexagonal truncated bicone; tsp. ultramarine; 2 specimens.
3) IIa; barrel-shaped; op. white body cased in clear glass; 4,548 specimens. Beads are non-uniform in size with rounded ends, resembling small pebbles. Surfaces of most beads are crackled. This is the bead previously described as *galet blanc*, cousin to the *galet rouge*.
4) IVa; barrel-shaped; op. brick red outer layer cased in clear glass; tsl. light to dark green core; 587 specimens. Called *galet rouge*.
5) IVbb; barrel-shaped; op. brick red outer layer with four op. black on op. white stripes; tsl. light green core; 7 specimens.
6) IIbb; barrel-shaped; op. black body decorated with six op. brick red on op. white stripes; surface eroded; 1 specimen.

Row 10: Drawn multi-layered beads.

Strand of circular type IIa / IVa beads; average diameter: 4.6 mm. Two varieties are represented:

 a) IIa; circular; op. white cased in clear glass; irregular shape; often has a crackled surface and dull luster; 174 specimens. The *galet blanc*.
 b) IVa; circular; op. brick red outer layer cased in clear glass; tsl. dark green core; irregular shape; 608 specimens. The *galet rouge*.

Row 11: Drawn "seed" beads.

Strand of "seed" beads including cornaline d'Aleppo (10 specimens), tsp. colorless (328 specimens) and variously colored, opaque monochrome beads (417 specimens). Smallest recorded diameter:

2.4 mm. Beads of this size were worn in strands suspended over the forehead, as were the triangular-shaped shell beads (Lasnet 1900: 63).

Plate IC: Glass Beads and Metal Ornaments

Row 1: Monochrome wound beads.

1-3) Type WIIc faceted "five-sided" or "pentagonal" beads exhibiting eight pentagonal pressed facets. There are three varieties:
  a) tsp. amethyst; ends pressed flat; bead is almost doughnut-shaped; facets are incomplete; 3 specimens.
  b) tsp. amber; as no. 1; surface slightly eroded with thin white patina; 1 specimen.
  c) tsp. light gray; elongated body; slight erosion and white patina on most beads; 47 specimens; average size: 16.5 mm in diameter, 21.2 mm in length.

4) WIa; short cylindrical; tsl. opalescent milky white; the seam around the middle is where two beads fused together during manufacture. Relatively large hole; flat ends; 1 specimen.

5) WIc; irregular-oval; tsp. light gray; very crude; large perforation; rounded ends; 1 specimen.

Row 2: Monochrome wound beads.

The beads in this row range from tsp. opalescent light gray to op. milky white; 161 specimens.

1) WIa; short cylindrical; flat ends.
2) WIb; oblate; flat ends; two conjoined beads.
3) WIIc; pentagonal-faceted; squat specimens with flat ends.
4-5) WIb; oblate; flat ends.
6) WIc; irregular-oval.

Row 3: Monochrome wound beads.

Nos. 1-2 and 4 are doughnut or annular beads. These are among the most numerous of all the types recovered at Diakhité.

1) WId; doughnut-shaped; tsp. colorless; ridges at the edge of the perforation show where it had been joined to other beads on the mandrel. Probably more modern than the other annular beads. Numerous.
2) WId; doughnut-shaped; tsp. colorless; a heavy patina and decomposition have rendered the glass opaque. The specimen consists of four beads that fused together during manufacture. There are many examples of such fused annular beads at Diakhité. Numerous.
3) WIIc; pentagonal-faceted; tsp. colorless; 1 specimen.
4) WId; doughnut-shaped; tsp. amber; 60 specimens.
5) WIIf; ridged tube (pentagonal-sectioned); tsl. bright navy; ends ground flat; 53 specimens.
6) WIb; round; tsl./op. ultramarine; ends flattened; surface patinated and decomposed; 133 specimens.

Row 4: Monochrome wound beads.

1) WIb; round; tsp. colorless with a distinct amethyst tint; ends ground flat; 124 specimens.
2-3) WIIc; pentagonal-faceted; color as no. 1; ends ground flat; 123 specimens.
4-7) WIId; "raspberry" or "mulberry" beads; two rows of nodes; ends ground flat. There are four varieties:
  a) tsp. amethyst; 119 specimens.
  b) tsp. colorless; 39 specimens.
  c) tsp. light gray; 5 specimens.
  d) tsp. dark green; 6 specimens (not illustrated).

Row 5: Monochrome wound beads.

1-2) WIb; tsp. colorless to light gray (no. 2 exhibits a very light greenish tint); numerous internal bubbles; the ends of no. 1 have been ground flat; 328 specimens.
3) WIc; oval; tsp. bright navy; patinated surface; 2 specimens.

Row 6: Metal ornaments.

The bracelets, earring and finger ring are made of copper and brass, and are typical of others found at Diakhité.

OBSERVATIONS ON THE BEADS OF DIAKHITÉ

Among the Diakhité beads are several distinct kinds that merit special attention because of their historical significance and/or the high value placed on them. They include carnelian, cut crystal, amber, cowries and other shell beads, and certain glass beads.

Amber and faceted crystal beads were among the most expensive items traded in precolonial Senegambia. They were very popular back then, and, in the case of amber, remain so today. Because of their high value, they were traditionally worn by dignitaries and wealthy people. Given the economic and social structure of the Serer Nones, it is not surprising to find only a modest number of these beads at Diakhité.

A sense of the value of amber and crystal beads, and how they were utilized early in the trade comes from Abbot Demanet's account of his 1763-64 voyage to Senegal:

> Yellow amber is a must; and in order not to be obliged to weigh it, seven pieces are traded for one bar. Coral and amber serve to make necklaces and belts for kings, their wives, and for all who can afford them. They intersperse these necklaces and belts, made in the form of a rosary, with beads of coral, amber, fine crystal and fancy glass beads... (Walckenaer 1842, Tome V: 182).

An account written in 1800 reveals that "amber is gathered along the coasts of Prussia and Pomerania, and is formed into beads in Holland" (Pelletan 1800: 35-36).

Compared to the scarcity of amber beads at Diakhité (only five were found), the relatively large number of faceted crystal beads poses a problem for which we can offer no valid solution. During our two and a half years in Senegal, we found less than a handful of these beautiful beads at other sites. Furthermore, with one exception, we never saw them offered for sale by bead traders at any markets in the country. We know that "cut" crystal beads appeared in Senegal at least as early as the beginning of the 1600s, and remained a part of the trade through the 18th century. Why, then, are these beads found only at Diakhité in such significant numbers?

Carnelian beads appear at Diakhité in relatively large quantities, reflecting a popularity which has endured for centuries. Despite the two large faceted barrel-shaped beads that are reminiscent of the German style, all the others show forms and workmanship that can be connected to an industry existing in India well before the Germans learned to copy their technique (Dubin 1987: 113, 184).

Among the shell beads, cowries are present at Diakhité in small but significant numbers. Cowries were and continue to be popular in Senegal, but never took on the distinction attached to them elsewhere in Africa. Shell beads of local manufacture have also been found at Diakhité and represent a form of adornment that spans the centuries from prehistoric to modern times.

Cornaline d'Aleppo beads of both drawn and wound manufacture which have a thin transparent red layer over an opaque white core were uncommon at Diakhité, whereas their forerunners, the drawn green-cored varieties, show up in significant quantities. Beck tells us that the latter were exported to Africa in the 18th and 19th centuries "by the shipload" (Caton-Thompson 1970: 238). This long-lived popularity is further evidenced by their constant appearence in ships' manifests of the period in great quantities.

The historic French name for the green-cored beads is *galet rouge*. They are mentioned as an important part of the trade with Africa as early as the 1680s when they are described as large red-glass beads arranged in seven or eight strands worn around the waist (Cultru 1910: 107). Interviews with Senegalese women confirm the fact that wearing *galet rouge* beads in this fashion is a time-honored tradition that goes back many generations (personal observation). Cousin to the *galet rouge* is another bead very popular throughout Africa, the *galet blanc*, or white "galet" with its opaque white body and crackled, thin, colorless outer layer.

Finally, the chevron beads deserve mention due to their significant numbers at Diakhité. For the most part they are small barrel-shaped beads with four layers: tsl. bright navy on opalescent white on redwood on white. These are equivalent to no. 647 in the Venetian Bead Book (Karklins 1985: 77). Other chevron beads exhibit five layers, while two are shaped differently and have seven layers, the innermost one being transparent, indicating that they are an early variety. Descriptions of these beads during the precolonial period indicate that the French called them *margriette etoilee*.

BEAD ASSEMBLAGES AT DIAKHITÉ

Most of the beads recovered from the Diakhité sand pit were found loose in the soil so it is uncertain which varieties are associated with each other. This makes it very difficult to determine whether the site was occupied for a long time (as suggested by the early seven-layered chevrons and the crystal and carnelian beads) or if these beads are heirloom pieces. Fortunately, the contents of two intact pots found at the site in 1987-88 provide much useful information concerning bead associations and help to date the burial ground.

The contents of the larger vessel were "loose" in the pot so it was impossible to determine how the various beads were strung at the time of burial. Mr. Ibou Sarr, a worker at the sand pit who conveyed both pots to us, assured us that he found them intact and that other than removing sand and dirt from the larger pot, the contents had not been tampered with. We have no reason to doubt him as he understood our interest in recovering such articles untouched. The second pot leaves no doubt whatever as to the authenticity of its contents; the beads and metal ornaments were still cemented in place with dried sand, thus allowing us to observe exactly how the beads had been strung. In both cases, the fragile pots are made of local, fine-sand-tempered red clay, and exhibit simple decoration.

The Larger Pot and its Contents

The globular pot (*see* cover illustration) is 19.3 cm high and 24.2 cm in diameter. The mouth measures 10.8 cm across and the flat-lipped rim is 7 mm thick. The rim is decorated with five wavy incised lines which encircle the orifice. The body and the rounded bottom exhibit diagonal cord impressions.

The larger pot contained 2,693 beads of the following types:

1) Crystal (quartz); oblate; faceted (62 specimens).
2) Carnelian; standard/short hexagonal bicones (45 specimens); long hexagonal prisms (12 specimens); tapered long hexagonal prism (1 specimen); lozenge-shaped (1 specimen).
3) Amber; oblate (1 specimen).
4) If; tubular, cornerless hexagonal; tsp. colorless (71 specimens).
5) If and IIIf; tubular, cornerless heptagonal; op. bright Dutch blue, and bright Dutch blue over copen blue (100 specimens).
6) IIa; circular to barrel-shaped; op. white cased in clear glass; *galet blanc* (110 specimens).
7) IVbb; barrel-shaped; op. barn red on tsl. green with 4 op. bright navy on op. white stripes (1 specimen).
8) IIIk; faceted barrel-shaped "chevron" beads; four-layered (112 specimens).
9) IVa; circular to barrel-shaped; op. brick red outer layer cased in clear glass; tsl. light to dark green core; *galet rouge* (224 specimens).
10) WIa, WIb and WId; short cylindrical, round and annular; tsp. clear or light gray; "common" glass beads (1,854 specimens).
11) WIb and WId; round and doughnut-shaped; tsp. amethyst-tinted glass (87 specimens).
12) WIId; "raspberry" beads; tsp. amethyst-tinted glass (4 specimens).
13) WIIIa; cylindrical; tsp. ruby over op. white; distinctly-flattened ends; highly eroded (1 specimen).
14) WIIIb; round; op. black with combed design (Pl. IB, R. 3, #3) (5 specimens).
15) WIIIb; oval; tsl. bright navy with op. white floral wreath (Pl. IB, R. 3, #6) (1 specimen).
16) WIIIb; round; tsp. ruby with op. yellow floral wreath (Pl. IB, R. 3, #7) (1 specimen).

The following silver, copper and brass ornaments were associated with the beads (Pl. IC, bottom). All but the silver items appear to have been cold-hammered from square European bar stock by African craftsmen (K. Karklins 1989: pers. comm.).

1) C-shaped bracelets; brass; circular cross-section; flat ends; decorated with a spiral groove chiselled into the metal (2 specimens).
2) C-shaped bracelets; brass; hemispheric cross-section; decorated with a series of chiselled grooves set perpendicular to the long axis (1 specimen).
3) C-shaped bracelet; copper; square cross-section; decorated on the three exterior faces with a series of punched chevrons; plain bipyramidal ends (1 specimen).

4) Circular copper earrings open at the top; twisted square shank; extremities ground to a point (1 pair).
5) Rings; brass; one is a wide band decorated with a zigzag series of chiselled lines; the other has an oval-sectioned shank with a rectangular form in the center (2 specimens).
6) Small cone-shaped silver ornaments; 1.7 cm wide (3 specimens).

Given the large quantity of "fancy" beads, types which were among the most expensive and highly prized in precolonial Senegal, it is our opinion that the woman or girl with whom this pot was interred was among the wealthier and, thus, more important people then living at Diakhité.

The Smaller Pot and its Contents

The smaller pot is 16.4 cm high, 20.2 cm in diameter, and 5.7 mm thick at the rim. The mouth is 11.6 cm across. The lip is flat. A band of diagonal cord impressions encircles the rim and the base. The rounded bottom is also cord impressed. All like beads were held in place next to one another in the dried-sand matrix, indicating that, at the time of burial, all beads of one kind were strung together with no mixing of varieties.

The smaller pot contained only 408 stone and glass beads:

1) Crystal (quartz); oblate; faceted (50 specimens).
2) Carnelian; short and standard hexagonal bicones (89 specimens).
3) WIa, WIb and WId; short cylindrical, round and annular; tsp. clear or light gray; heavy patina (129 specimens).
4) WIb and WId; round and annular; tsp. amethyst-tinted glass (94 specimens).
5) WIIb; flattened "disc" beads; tsp. light gray; ends ground flat (19 specimens).
6) WIIc; "pentagonal" beads; tsp. light gray; ends pressed flat; almost doughnut-shaped; facets incomplete (11 specimens).
7) WIId; "raspberry" beads; tsp. amethyst-tinted glass (16 specimens).

In addition, the following copper and brass ornaments were found in the smaller pot. Most of these appear to have been cold-hammered from square European bar stock by African artisans.

1) C-shaped bracelet; brass; round cross-section; plain except for several grooves around the extremities; made by folding and hammering a long strip of sheet brass into a round-sectioned rod and then bending it to shape (K. Karklins 1989: pers. comm.) (1 specimen).
2) C-shaped bracelets; copper; round cross-section; several grooves encircle the extremities (2 specimens).
3) C-shaped bracelet; brass; square cross-section; decorated with perpendicular (to the shank) lines chiselled into the three exterior surfaces; bipyramidal extremities; rectangular protuberance in the middle (1 specimen).
4) C-shaped bracelets; brass; round cross-section; decorated with spiral grooves; stippled rectangular protuberance in the middle; bipyramidal extremities (2 specimens).
5) C-shaped bracelets; brass; hemispheric cross-section; undecorated; rectangular protuberance in the middle; bipyramidal ends (2 specimens).
6) Circular earrings; copper alloy; twisted square shank (1 pair).
7) Rings; copper alloy; undecorated; varied sizes and thicknesses (3 specimens).

Dating the Intact Pots

Karlis Karklins (1989: pers. comm.) provides the following comments concerning the temporal placement of the beads in the two intact pots:

> The larger pot contains quite a temporal mix of beads. Beads definitely diagnostic of the 18th century are rare (type WIId). Some of the WIb and WId types may also relate to this period but most have a much more recent appearance (that is, no patina or surface erosion). The crystal and carnelian beads may also date to the 18th century although it is quite possible that they are much older.
>
> The relatively common *galet blanc* (called "crackled whites" in southern Africa) and *galet rouge* specimens characteristically occur together throughout southern and eastern Africa at 18th to early 19th-century sites (David

Killick 1989: pers. comm.). The WIIIb wreath-decorated varieties also fall into this time period.

The most recent specimens include the If/IIIf varieties, the IIIk four-layered chevrons and WIIIa beads which are the most common during the 1805-1870 period. These beads suggest that the larger pot was interred during the late 18th or early 19th century, and that the early varieties are heirloom pieces.

The three diagnostic bead types in the smaller pot (WIIb, WIIc and WIId) are found on archaeological sites that were occupied from around 1650 to 1833, and have modal dates that cluster around 1725-30. The absence of the later varieties found in the larger pot suggests that the smaller vessel is somewhat earlier.

DATING THE DIAKHITÉ BURIAL GROUND

The following comments regarding the chronological position of Diakhité were also provided by Karklins (1989: pers. comm.):

> The glass beads recovered from the Diakhité sand pit span the period from about 1500 to 1900. The two faceted seven-layered chevron beads (IIIk) are the earliest specimens and can be attributed to the 16th or 17th century. The crystal beads, similar to those called "Florida Cut Crystal" in North America, may also date to this period, but have also been found in 18th-century contexts (Marvin T. Smith 1989: pers. comm.).
>
> The distinctively-shaped wound beads such as types WIIb, WIIc, WIId and WIIf are generally attributable to the 18th century. Some of the WIb, WIc and WId varieties probably also date to this period.
>
> The drawn-faceted (If/IIIf), four-layered chevron, and red-on-white and decorated wound beads are primarily of styles that span the period from around the end of the 18th century to the early 20th century. However, based on the luster, degree of patination, the quality of the workmanship and other factors, it is apparent that the earlier part of this date range is represented. The absence of "mandrel-pressed" and Prosser-moulded beads which post-date ca. 1825 (Ross 1989) and 1840 (Sprague 1983), respectively, tends to confirm this.

While it is possible that the Diakhité site was utilized for several centuries, the temporal mixture of beads in the larger pot suggests that the earliest specimens are heirloom pieces, handed down from generation to generation or obtained from native traders. It is, therefore, probable that the Diakhité burial ground was first utilized during the 18th century and had been abandoned by the middle of the 19th century.

CONCLUSION

The beads found at the Diakhité burial site reveal that it was used by the local Serer population from the 18th century to around the middle of the 19th century. Although the dates are based primarily on data derived from archaeological sites in the eastern United States and the Caribbean (there are presently very little published comparative data from West Africa), there appears to have been very little, if any, time lag between the arrival of specific bead types in coastal West Africa, and these areas (Karklins 1989: pers. comm.). Thus, the accuracy of the dates assigned to the Diakhité beads seems assured.

As elsewhere in West Africa (DeCorse 1989; Lamb and York 1972), the heirlooming of beads seems to have been a common practice at Diakhité and hampers the estimation of accurate site-occupation dates. Such heirlooming of personal material continues to be an important cultural aspect among Senegalese women. Still counted among their most-prized possessions are beads of all kinds and metal bracelets, rings and earrings.

Although this study has been conducted as scientifically as possible, we are the first to admit that much more information would be forthcoming were an official archaeological excavation conducted employing proper field techniques and trained personnel. A systematic stratigraphic investigation of the site would, we are sure, further advance the study of beads in a little-known part of the world and uncover new insight into the life and times of the people who inhabited Diakhité in the past.

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BEADS OF THE EARLY ISLAMIC PERIOD

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Beads from four sites involved in Early Islamic trade (7th to 12th century) are representative of the role the Muslim world played in the Indian Ocean Bead Trade. The continuation of Classical techniques, the Islamic trade's self-sufficiency, and the insight beads provide concerning past behavior are some of the issues explored.

INTRODUCTION

There has been a quantum leap in bead research in the last decade. There are now information stores and networks of communication established, and many papers have been written on beads, some discussing how to study or to describe them (Karklins 1982; Kidd 1983; Spector 1974; Sprague 1985). All of this is gratifying, but bead research must go beyond mere description to realize its full potential.

Bead research is an interdisciplinary inquiry, closely allied to archaeology (Francis n.d. e). However, the high variability of beads has deterred archaeologists from studying them. That is changing, and where serious studies have been done, as in North America, much has been learned about them. But what is the next step?

This paper presents a tentative answer to that question by outlining a methodology whose utility may be judged by how it is applied here. The raw data of bead research comes from many sources: archival (history and ethnohistory), comparative (archaeology and ethnology), and observational (a detailed cataloguing of an assemblage). Researchers must be familiar with the site involved and its cultural milieu. Following cataloguing using standard descriptions, the data derived are used to answer many questions. These are specific for each bead, but can be grouped into four categories: 1) what is the origin of the bead? 2) how did it arrive at the site? 3) how was it used at the site? and 4) how did it leave the systemic (living) context of the site to enter the archaeological? These answers in turn are data for regional studies based on related sites, often concentrating on specific aspects, as this one does on trade. Data from many different regions may ultimately lead to hypotheses about the universal aspects of human adornment, aesthetics, the role of visual symbolism and social status, and magico-religious beliefs.

BACKGROUND TO THE SITES

The Islamic world stretches from North Africa to South Asia and beyond. It was quickly formed. The Prophet Mohammed died in A.D. 632, and within 80 years Muslim forces were in Spain and Pakistan. With some additions and a few subtractions, this region remains the Muslim world today.

The people of this region are not homogeneous. They were once pagans, Jews, Christians, Zoroastrians, and Hindus, and spoke Hamitic, Semitic, Turkish, and Indo-European languages. With Islamization, a parallel but more profound process took place: Arabization. People from Morocco to Iraq speak Arabic and call themselves Arabs. This process was resisted at the fringes. Spain (which rejoined Christiandom), Turkey, Iran, and the lands to the east are Muslin, but not Arabic. There are also internal divisions, one of which, the 1400-year-old Sunni/Shiite dispute, still rocks the world from the Levant to the Durand Line.

Yet the Muslim world is marked by cultural unity. A common language and script, a common faith, common habits, common customs, common viewpoints, and ultimately common tastes characterize much of

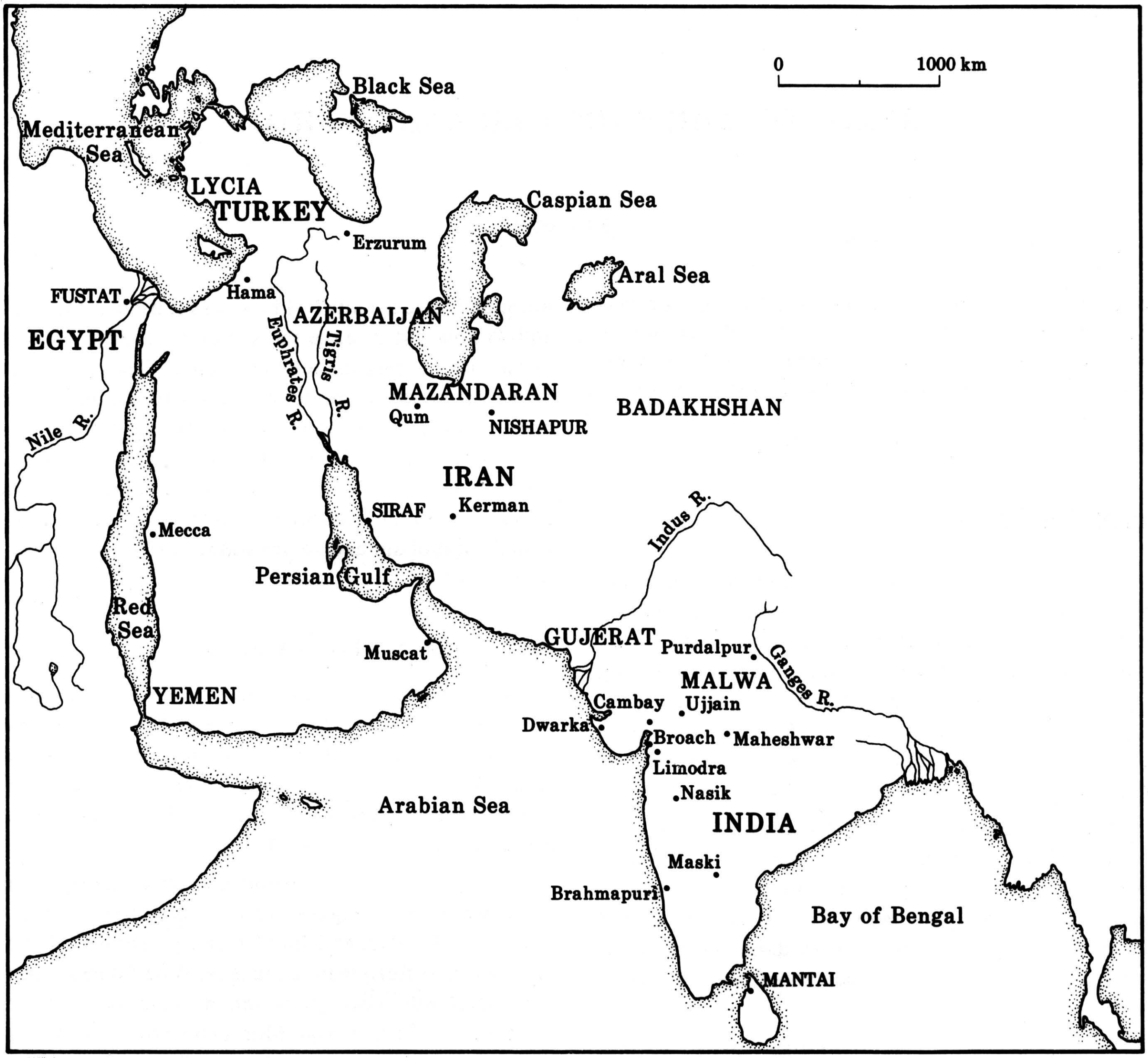

Figure 1. Eurasia during the Early Islamic Period (drawing by D. Kappler).

Islamic art. But it is always a unity with much diversity.

The Islamic world has long been both a link and a barrier to other world cultures. Geographically, it joins Europe, Afica, and South and East Asia. Muslims controlled the vital sea lanes for a thousand years; land trade was also often in their hands. the Early Islamic Period (7th to 12th century A.D.) served as a temporal bridge between the Classical Age and the era of European domination of most of the globe.

Since Islamic history is ignored in our schools and interest in Islamic art lags behind that of other regions, little is know about Islamic beads. This paper opens the study of these beads, presenting results from research of three Early Islamic sites: Nishapur and Siraf in Iran, and Fustat in Egypt (Fig. 1). These were examined as part of a larger project coordinated by the Center for Bead Research to study the bead trade of the Indian Ocean.

These sites are roughly contemporary, occupied from the 7th to the 12th century. Nishapur and Siraf were founded by the Sasanians, the last pre-Muslim dynasty, but both flourished under Islam. Nishapur was one of the largest cities in the world, a cultural and religious center, whose most famous son was Omar Khyyam. It was destroyed by the Mongol, Tili Khan, who captured it in 1221, slaughtered the citizens, razed the city, flooded it for a week, and had barley planted on the spot. Isfizari said 1,747,000 people died (Melville 1980:109). Siraf grew quickly to become a major port by the 9th century. Then it declined slowly after a week of earthquakes in 977 and the fall of the Buyid dynasty (ca. 1050), who favored the port.

Fustat was founded in the year 20 Hegira (A.D. 641), as a tent city pitched next to the Byzantine stronghold, Babylon (Door of Colors). Fortified Cairo grew up next to Fustat, which remained the commercial and social hub of Egyptian life. At the approach of the Crusaders, Vizir Shawar ordered 20,000 vessels of naphtha to be poured into the center of Fustat, and on 22 November 1168, the rampartless Fustat was put to the torch. It burned for 54 days and smoldered for months afterwards (Scanlon 1965:7-8).

A fourth site is also considered here. Mantai, Sri Lanka, was not an Islamic city, but is contemporary with the other sites, being abandoned by the 10th century. It was a vital trade link for the whole Arabian Sea/Indian Ocean Trade.

Despite similarities between these cities, each played different roles in international trade. Fustat was the link between the Mediterranean and the Red Sea, the preferred destination for many goods, and a world-class mart. Siraf, on the north coast of the Persian Gulf, was an active port, trading with Zanzibar and Madagascar and with China until the Canton massacre of Persian merchants in 878. Mantai was a major exchange depot for goods coming from the East and the West; crews returned home from there after exchanging their cargoes for those coming from the other direction. Nishapur was far inland, but lay astride the Silk Route, which joined the Mediterranean world with China and India.

Since the quality of artifact studies depends upon how the artifacts were gathered, the excavations at Siraf by David B. Whitehouse, at Mantai by John Carswell, and at Fustat by George Scanlon furnish us with scientific data. Each of these excavators has kindly allowed me to study his beads, though the Siraf material in the British Museum is only part of what was uncovered, and much from Fustat is scattered. Nishapur was excavated before World War II by Charles K. Wilkinson for the Metropolitan Museum of Art, New York. A Hagyop Kevorkian Fund grant allowed me to catalogue these beads for the Islamic Department (Francis 1987a). They were excavated according to the highest standards of the time, but modern advanced techniques sometimes makes us yearn for more data.

The Fustat material presents the most problems. Aside from Scanlon's work, most Fustat beads in the Islamic Museum, Cairo, are from private collections picked up at the site or purchased. The most important of these are those of Dr. Foqui, bought by the (then) Arab Museum in 1893, and of King Fouad (1922-1936), Farouk's father. Hence, we cannot treat these beads statistically as we can those from the other sites, a regrettable but inescapable situation.

THE MATERIAL AND THE ORIGINS OF THE BEADS

It is common to first identify the materials from which beads were made, as this may lend clues to their origin. As for glass beads, the method by which they were made should be identified at this stage as well. Despite similarities among these sites, there were also marked differences. While glass predominated at Fustat and Mantai and accounted for 46.2% of the beads at Siraf, jet was the most common material at Nishapur, accounting for 40.8% of the beads. The differences between two contemporary Persian sites can be seen in Table 1.

**Table 1.
Bead Material Groups
at Siraf and Nishapur.**

Material	*Siraf*		*Nishapur*	
	n.	%	n.	%
Mineral	62	24.7	159	23.2
Organic	33	12.7	325	47.5
Synthetic	156	62.5	202	29.4

Organic Materials

The only organic material found at all four sites was precious coral (*Corallum rubrum*). Two beads each were found at Siraf, Nishapur, and Mantai, and an 11th-century cache was uncovered at Fustat (Scanlon 1988: pers. comm.). The coral trade at Fustat/Cairo is well documented in papers found in a Jewish *Genizah*, preserved because they contain the name of God. Egypt was the hub of this trade, especially to India (Goitein 1961: 170; 1963: 198). In one letter Issac Nishaburi (Issac of Nishapur) boasted of his coral's high quality in 1119 (Goitein 1973: 247-248).

Jet was the most abundant material at Nishapur, but found only there, except for one bead at Mantai. Jet is a form of coal, sometimes called "vitrain" or "bright coal" (Pettijohn 1957: 490-495). Some or all of the beads identified as jet may be some closely related form of coal (Pollard, Bussell and Baird 1981). There are no reported jet sources in Iran, but there are coal deposits near Kerman (Ganji 1970: 571), and some nearer Nishapur (Crabbe and McBride 1979: 207). Otherwise, the nearest known sources are in Turkey, in Lycia, exploited in Classical times (Eichholz 1962: 113), and in the west around Erezrum, currently being worked.

Marine-shell beads were found at Siraf (12 specimens) and at Nishapur (38 specimens); *Conus* was the most common genus. *Conus* spires severed from the base and ground into rings accounted for half the shell beads at Siraf (Fig. 2,a). At Nishapur such shells were left whole, and a small clay bead shaped like a *Conus* shell was also found. Other shells included *Oliva* and probably *Olivella, Cypreae moneta* (the money cowrie, at Nishapur), and *Dentallium* (at Siraf). At Siraf, bangles were made from the conch, *Turbinealla (Xancus) pyrum*, and the columella of the shell was apparently used to make beads; similar beads were also found at Nishapur.

An object marked "pearl?" from Siraf is a much-foliated specimen, stabilized with some chemical. Istakhi in the 10th century said that Siraf was a "great market for pearls" (Sastri 1937: 437). Whitehouse (1972: 67) examined local shell middens, concluding that they were not exploited for pearls, but the market need not be located where the oysters are fished.

Bone and ivory were used for a few beads, mostly at Siraf, and especially for spindle whorls. A back material used for beads from Siraf may be bitumen or asphalt. Nishapur was the only site with amber, most likely from the Baltic region; the significance of this will be discussed later.

Mineral Materials

At Siraf and Nishapur, minerals accounted for a quarter of the beads. Quartz minerals (rock crystal and amethyst; the chalcedonies, including agate and carnelian; and the jaspers) dominated, with carnelian being especially popular (37.1% of stone beads at Siraf and 35.8% at Nishapur).

Lapis lazuli accounted for 8.3% of the beads from Nishapur and 14.5% from Siraf. Turquoise, mined near Nishapur, was not very common, with only three pieces from Nishapur and four from Siraf. Of these, only one from each site was a bead, the rest being cabochons to mount into metal jewelry. This emphasizes the friable nature of this stone and its relative scarcity as a bead in the past.

All the important stone beads traveled eastward to these sites. Lapis lazuli came primarily from the Lajwurd Valley of Badakhshan in northern Afganistan. Jenkins and Keene (1982: 26-32) suggested that Nishapur may have been a lapidary center for lapis, but there is no evidence to that effect, and the larger number of beads at Siraf may suggest otherwise. Ḣamd-Allah Mustawfi, the State Accountant of Sultant Abu Said (1316-1355) mentioned Iranian lapis sources in Manzandaran and Azerbaijan and near Kerman, but the first seems unlikely on geological grounds and the other two may have been worked for only a short time (Herrmann 1968: 27).

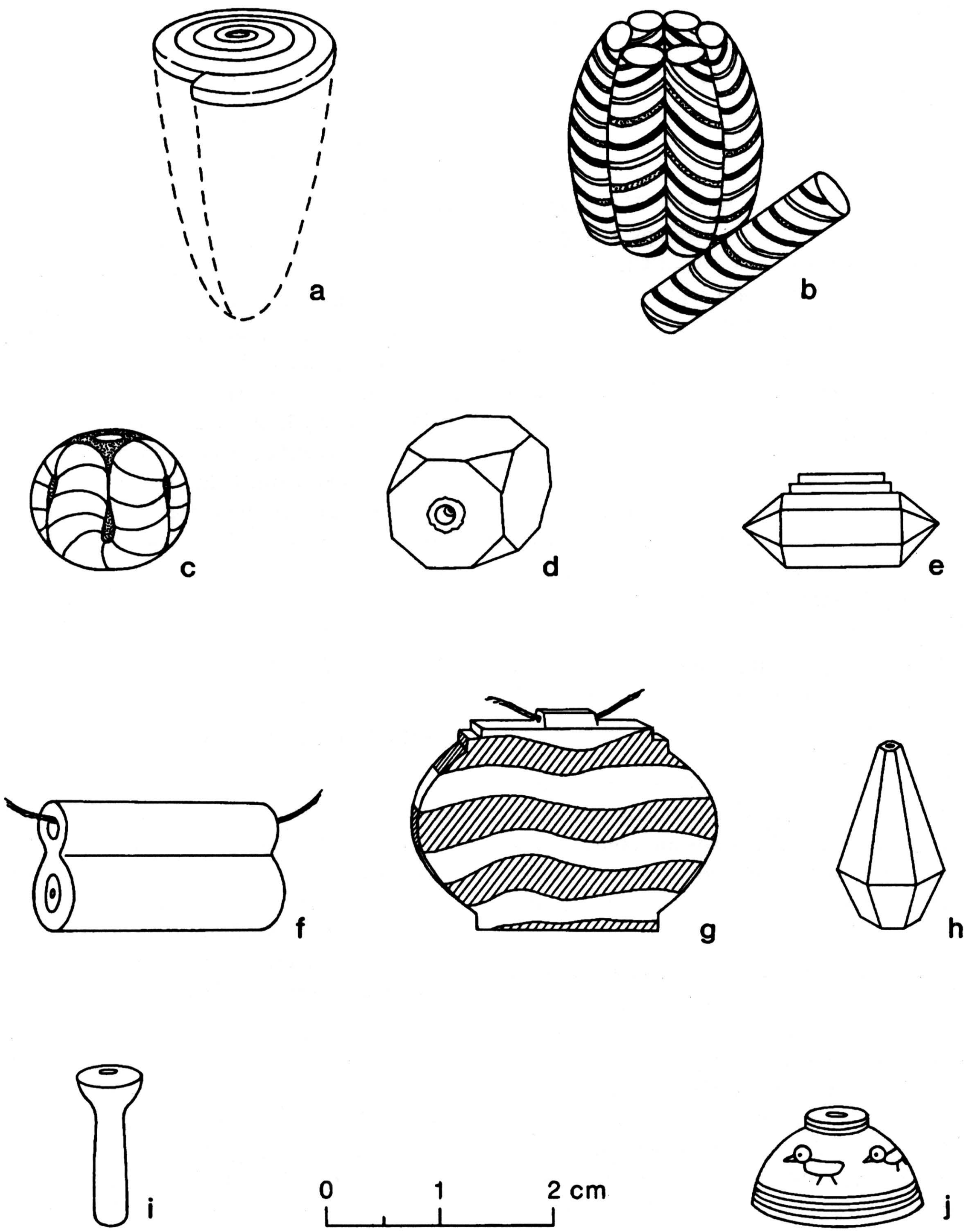

Figure 2. Selected beads of the Early Islamic Period: a, Conus, shell top disc, Siraf; b, Fustat Fused Rod Bead and cane (rod); c, Torus folded glass bead, Siraf; d, green jasper cornerless cube, Siraf; e, rock crystal charm case bead, Nishapur; f, soft red stone double tube bead, Nishapur; g, flat Babaghoria agate pendant; h, octagonal drop Imam bead of carnelian, Nishapur; i, stud-shaped opaque yellow glass Imam bead, Nishapur; j, ivory spindle whorl, Nishapur (drawing by D. Kappler).

The quartz minerals, especially carnelian and onyx, are particularly abundant in western India, where nodules have been gathered for millennia along the banks of the Narmada River. By Roman times they were cut in and around Ujjain, and sold through Broach. In the 11th century the Solankis of Gujarat defeated the Paramaras of Malwa, taking the Narmada Valley, Malwa's only link to the sea. The lapidaries were moved to Limodra, now a sleepy village, but once called *Manipur Shahr* or "Bead City." This remained the lapidary center until replaced by Cambay in the 16th century (Francis 1982).

However, quartz is the most widespread mineral on earth, and its gems are found in many places. Al-Hamdani (died 945) wrote in *Al-Iklal* that onyx and carnelian were mined in Yemen (Faris 1938: 28-29), and Niebuhr (1774: 125) reported the same thing eight centuries later. Yet these stones were imported into Yemen and its neighbors from India steadily since at least the 10th century (Hassan 1928: 127; Francis n.d. d). It may be that Yemen produced stones only for seal rings and not beads.

Whitehouse (1975) called attention to carnelian sources near Siraf and elsewhere around the Gulf. Beadmaking evidence at Siraf includes a few roughouts, chips, unfinished beads, and some pebbles that may have been raw material. The work was done in Locus E, a residential area with mostly late (14th-15th century) buildings. The beads are crude, and no faceting was done. India probably accounted for the lion's share of beads in the region and virtually all of the trade.

Although we have no statistics, ornamental stone use at Fustat paralleled the Persian sites. A collection of 15 9th-10th-century seals donated to the Islamic Museum by Dr. Henry includes eight of carnelian and one each of yellow chalcedony, black chalcedony, red jasper, green jasper, garnet, blue glass, and a soft green stone. In the 12th century Al-Khazini, in the *Book of the Balance of Wisdom*, said that stones were so common that they were devalued. Turquoise with any matrix, lapis lazuli, rock crystal, and amethyst were all cheap; only onyx was prized. Of carnelian he said, "men have long tired of the cornelian, so that it has ceased to be used for seal-rings, even for the hands of the common people, to say nothing of the great" (Khanikoff 1860:64).

Two stone bead technologies found at Nishapur deserve attention. The one is the glazing of quartz crystal by applying soda and adding heat. Beck (1935) pointed out the antiquity of this practice, but its survival into Early Islamic times is significant. Most quartz beads at Nishapur were glazed (11 of 16), and were crude oblate beads or pendants with white surfaces and deep blue, probably cobalt, glazes.

The other technique is widely called "etching," even though acid is not involved. Soda is added to the surface of the stone, and it is more appropriate to refer to these as "soda-etched carnelians." They are known form Harappan and contemporary Mesopotamian sites, and were likely made in both places (Reade 1979). In Early Historic India there were at least two centers of manufacturing (Dikshit 1949). The Sasanian Persians learned the technique (Francis 1980), and now we have evidence of their being made in Early Islamic times. The shapes and patterns of these beads match those in Beck's Period III (ca. A.D. 600 to 1000), and they are distributed west of India, as far as Russia and Scandinavia (Beck 1933; Francis 1980; 1987a).

Synthetic Materials: Faience

Faience was the second most common bead material at both Siraf and Nishapur (11.6% and 20.3% of all beads, respectively). It is a ceramic, less homogeneous than glass, with a core of partially fused (sintered) silica particles, usually quartz, and a glaze, a layer of true glass. Since the core and glaze expand differently under thermal conditions, nearly all ancient and medieval faience beads have lost their glaze completely.

Faience can be made by any of three methods, all of which were used in ancient Egypt (Tite, Freestone and Bimsom 1983). In modern Qom, Iran, bead cores are packed in a glazing mixture and fired, and removed afterwards (Wulff 1966; Wulff, Wulff and Koch 1968). The beads from Siraf and Nishapur, like those from Persepolis a millennium earlier (Schmidt 1937: Table III; Persepolis Museum, personal observation), resemble the modern Qom product. We appear to have an unbroken faience tradition in Persia from at least the time of Alexander.

However, it has been assumed that faience production died out in Persia only to be revived in the 12th century (Allan, Llewellyn and Schweitzer 1973: 171; Lane 1947: 9), and that the Qom beadmakers may have then come from Egypt (Wulff, Wulff and Koch 1968). The Siraf faience beads come from later deposits, from Locus E and form other late levels (Whitehouse 1988: pers. comm.). At Nishapur a faience pendant is dated from the late 8th-10th century, but it is impossible to tell how many beads may have been surface finds. It is tantalizing to suggest that we have evidence here for the continuation of faience production in Persia, but more data are clearly needed.

The faience beads at these sites are large and crude, usually suboblates, sometimes poorly scored to make gadrooned or "melon" beads. Some from Fustat are short cylinders retaining some glaze. Nishapur has a few crudely-molded pendants. Better beads in small numbers were found at Nishapur and Siraf, perhaps indicating a different source. Although no manufacturing sites have been identified, this faience seems to have been made only in Egypt and Persia, and hardly ever exported.

Synthetic Materials: Glass

Glass was the major bead material at Siraf, Mantai, and Fustat, taking a back seat only at Nishapur. A state of matter rather than a substance, it is made by melting metals and cooling them below their point of crystallization without allowing them to crystallize. As used here, glass is always a man-made product, with silica as the primary ingredient.

There is no evidence for glass beadmaking at Nishapur. Siraf has glass kilns and made objects from glass, but apparently not beads. Fustat was a glass beadmaker, and one problem is to determine which beads were made there.

In the case of Siraf we are at a disadvantage because the environment is ideal for the corrosion of glass. Many beads have a black or white incrustation, and fragile interiors. This type of corrosion is believed to be the result of an imbalance in the glass formula, either too much lime in relation to the silica or too little silica in the batch (Griffiths 1980: 87). Corrosion types may furnish clues to the origins of beads, but much more work needs to be done along these lines.

There are many ways to form a bit of glass into a bead. We shall discuss these beads according to their manufacturing methods. Edward Hill of Glassblowers of Greenwich consulted with me on some of these techniques.

Wound Beads. The oldest way to make a glass bead is to dip a rod (a mandrel) into a crucible at a furnace and twirl it until a bead is built up. Lampwinding, as practiced in Venice and elsewhere, is a relatively new development. All Early Islamic wound beads were made at the furnace, but few are distinctive enough to be associated with a particular industry. Some beads from Nishapur with wave and blob designs are similar to contemporary Syrian glass (Francis 1988a: 79), and a combed black and white bead resembles one from Hama, Syria (Riis, Poulson and Hammershaib 1967: 68, 212A).

Several of the wound beads from Fustat and Nishapur are decorated with slices of fancy mosaic cane, widely thought to have been a mostly Egyptian industry. Some eye beads made with simple canes are like those being illegally dug at Jenne-Jeno, Mali.

Drawn Beads. In this process, a glass tube is pulled (drawn) from a hollow gather of glass. The tubes are then cut into short segments, packed in ash, and stirred over heat to round off the sharp edges. The largest group of drawn beads — the small, monochrome Indo-Pacific type — was found at Siraf. These beads are widely distributed and were made in several centers (Francis 1989), but those at Siraf were most likely from Mantai (Francis n.d. a). The large number of Indo-Pacific beads at Siraf (39.7% of the glass beads) is as significant as their absence elsewhere, as we shall see later.

A small drawn tube bead with an opaque yellow core and a translucent green coat was found at Nishapur, and a similar bead was found at Mantai. These beads are most common in the Deccan or peninsular region of India, and are known from Early Historic Nevasa (Deo 1960: 355) and Navadatoli (Deo 1971: 361), as well as medieval Nevasa (Deo 1960: 361) and Brahmapuri (Sankalia and Dikshit 1952: 104).

There are other complex drawn beads in the Foqui collection in the Islamic Museum. They are discussed separately below.

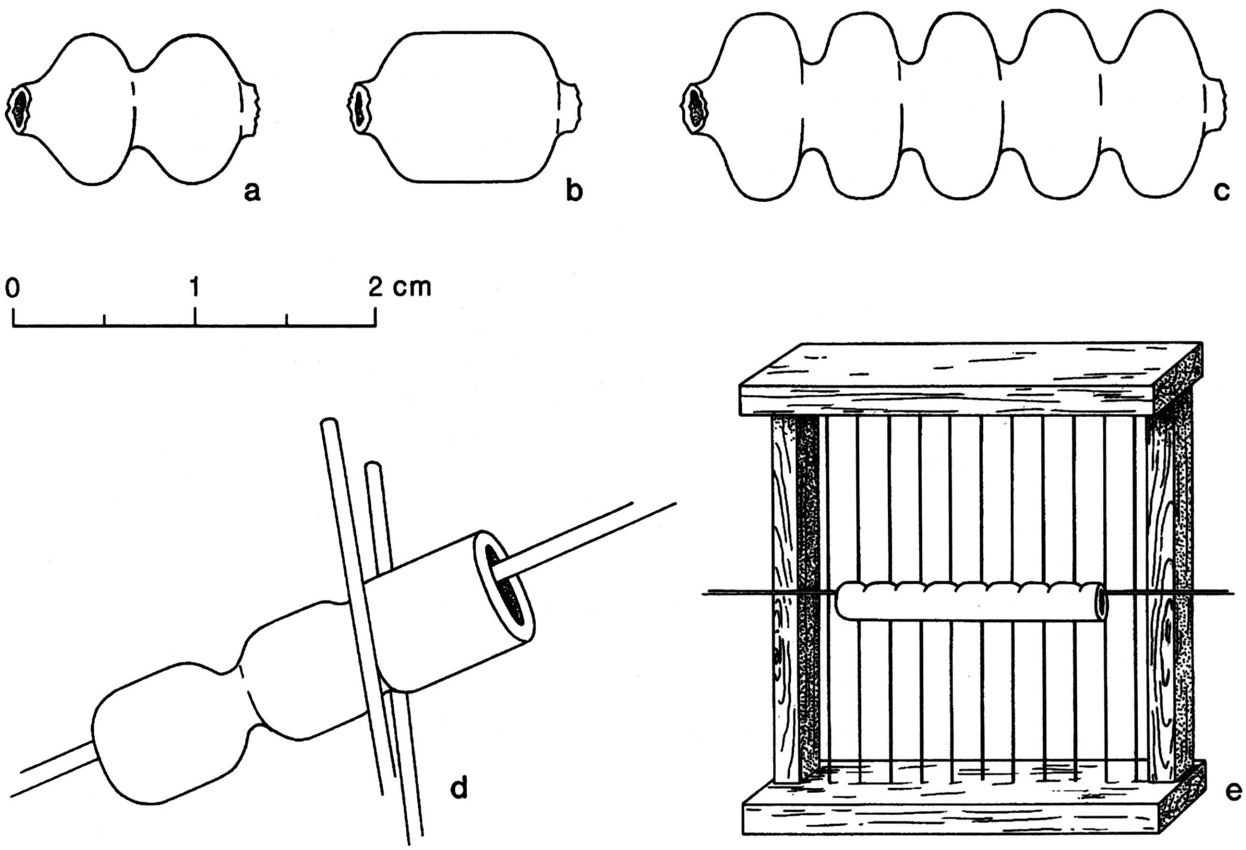

Figure 3. Segmented Early Islamic beads and their hypothetical production: a, "onion" double-segmented bead, Mantai, Siraf and Nishapur; b, fine segmented bead, Siraf; c, segmented tube, Fustat; d, glass tube being segmented with a pincher or two wires; e, segmented beads made by being rolled in a frame with wires or blades (drawing by D. Kappler).

Segmented Beads. Segmented beads also begin as tubes, which are placed on a wire, and held near the furnace while being constricted along their lengths. The resulting bulges are then cut apart to form one or a series of beads (Fig. 3,a-c). Precisely how this was done is not known; the process has not survived to our day, although it was once quite important. Hill (1988: pers. comm.) has suggested that in addition to a pinching device already proposed to constrict the tube (Fig. 3,d), the operation may have been done on a box or frame mounted with wires or blades (Fig. 3,e).

The most remarkable segmented beads are the gold-glass (or gilt-glass or goldfolium) beads, made from two tubes of glass, the inner one being covered with gold or other foil, and the outer one protecting the foil. They have a pan-European (Callmer 1977: 88-89) and a pan-Asiatic (Francis n.d. a) distribution. At least some were made in Coptic Egypt (Boon 1966), while India has been suggested as a manufacturing center (Dikshit 1969: 56-58; Singh 1983).

Segmented beads have received scant attention, but were once clearly an important class of beads. Not only are they found at these four sites, but they are known in Europe, Southeast Asia and beyond. This is not the forum to discuss the many types of segmented beads, as they deserve a study of their own, but two types deserve mention here. One was apparently made in Fustat, as waste tubes are in Dr. Foqui's collection. They are short cylinders with wide diameters (about a centimeter) and thin walls in opaque yellow and translucent green, blue, and colorless (Fig. 3,c). The other type was made by folding a striped ribbon into a tube and constricting it. These were made at Mantai (Francis n.d. a), and a few were found at Siraf.

Fustat Fused Rod Beads. The term "fused rod" was coined by Scanlon (1988: pers. comm.) to describe an unusual and highly conspicuous bead (Fig. 2,b; Pl. ID). They were made only during a short time around A.D. 900, but were well-traveled. One is in the Seligman collection of Chinese beads in the British Museum (acc. no. 1940-12-14-82), while another was found in Birka, Sweden (Pinder-Wilson and Scanlon 1987: 71).

Superficially, these beads look like barrel beads with zones combed into an ogee pattern. However, they were made by bundling six spirally-decorated glass canes (rods) around a central perforation. The canes are of a bubbly translucent-green glass with opaque white, yellow, red, and blue stripes; both right- and left-handed twists were needed. The precise manufacturing process in not know. Red clay in the perforations and sometimes on the surface may suggest a mold, but Hill (1988: pers. comm.) has opined that the work could have been done on a wire, with the clay as a separator.

Scanlon (1988: pers. comm.) uncovered about 50 of these beads, many of them broken lengthwise, and a single cane. Some 30 more are in the Islamic Museum. They are fairly large, up to two centimeters in length. Some have added eye decoration. Because they are easy to spot, their origin is known and they are widespread, investigators should become aware of them as temporal indicators.

Folded Beads. Another beadmaking technique consists of heating a plaque or ribbon of glass, bending it over a wire, and joining the edges to make a bead. A seam usually parallels the perforation. A few folded beads were found at Nishapur, Siraf and Mantai. This was also once an important technique, though not as important as segmenting. We know nothing about where such beads were made.

One notable folded bead type has been called "torus folded" by Summerfield (1985: pers. comm.). It was made in two parts, with a spherical core and an outer ring (torus) of striped and twisted glass. The ring was folded onto the core so that it covered the surface with an undulating polychrome line (Fig. 2,c). These beads were once thought to be Roman (Neuburg 1949: Pl. XXXI, no. 109), but their uncovering in a Muslim context at Kilwa (Chittick 1974: 467-468) and at Siraf strongly indicate an Early Islamic date for them.

Mosaic and Polychrome Drawn Beads: Dr. Fouqi Collection. The collection of beads and wasters donated to the Islamic Museum by Dr. Foqui has already been mentioned. Nothing definite about him has been learned, but it is believed that the material is from Fustat. Some of it is so surprising and potentially important that it deserves special consideration.

The collection has drawn beads, tubes, mosaic canes, and similar material of high-quality glass and fine workmanship (Pl. IIA). For example, one tubular bead has an inner layer of red, followed by white, red, white and red layers, with a surface decoration of six compound white/blue/white stripes. In all, there are eleven tubes or cut segments, most of them striped and some of them twisted; four similar unperforated flattened pieces; ten mosaic canes; two beads made of concentric red and white mosaic canes without cores; and nine other pieces of beadmaking waste, including bent and unusable tubes.

This material comes from a beadmaking site, but where? At first it strikes one as modern, but could it have come from early Islamic Fustat? The following seem to be the most likely possibilities:

1) *The material is local, but of Ptolemaic-Romano or Coptic date.* This seems unlikely, as there are no beads known to me at such an early date that are made from multiple-layered or striped drawn tubes.
2) *It is local, but much later, and represents an attempt to duplicate European (Venetian) beads.* Glassmaking continued in the area after Fustat burned. A decree of 1309 attempted to minimize the danger of glasshouse fires to Cairo; Ibn Douqmak (ca. 1400) noted glasshouses in Fustat itself (Clerget 1934: 270). Starting in the 15th century, glassmakers rarely produced their own glass, importing cullet from Venice or melting down old bottles (Clerget 1934: 272-273). Travelers in the 18th and 19th centuries commented on the low quality of Egyptian glass and the limited range of production (Clot-Bey 1840, II: 316; Fesquet 1843: 93; Raymond 1973, I: 341, 354). The debased tradition continues to the present; only a few workers make crude beads using recycled glass (personal observation).

3) *The material is not local. Maybe some friend of Dr. Foqui went to Venice and came back with....* The collection may be badly contaminated, with Venice the most likely source. However, while these beads could have been made in Venice, none have any molded elements. There are no tubes with star or wavy (chevron) layers and no mosaic canes with molded elements. This does not prove that the material is not Venetian, but molding has been a hallmark of Venetian work since the late 15th century (Buckley 1939: 19; Zecchin 1968), and a Venetian collection of mo- saic glass without molded elements would be most unusual.
4) *The material represents a Venetian attempt to start an Egyptian industry*. The history of Venice is full of workers going elsewhere to set up shop, the selling of secrets, and the smuggling of canes (Francis 1988c: 44-45). Nothing is known of any Egyptian venture, and one would think that the census at least would have taken note of it. There is the peculiar assertion by Morazzoni (1953: 64) that by 1900, Egypt, Albania and Turkey were giving Venice heavy competition. The Turkish industry could never have been a threat (Francis 1979b: 2-7), Albanian beadmakers are completely unknown and, on the face of it, Egypt looks doubtful as well.
5) *The material is from Early Islamic Fustat*. The process of elimination brings us here, and upon reflection, it is not so impossible. Striped drawn beads are known from early centuries A.D. at Mantai and Noruzmahale, Iran (Oda 1966: 31), from medieval Mantai (including a cut tube end) and Siraf, 9th-century Igbo-Ukwu, Nigeria (Shaw 1970: 230-239), and from many sites in Southeast Asia, as early as the 7th century (Francis 1989). Mosaic canes are also known in medieval contexts, such as on beads from Nishapur.

   However, precise parallels for the beads from Dr. Foqui are not evident, and though a medieval Islamic date may be possible, the case is hardly closed. Any new evidence, discussion or hypotheses are most welcome.

BEADS AND THE BEAD TRADE

The trade in beads and bead materials is very ancient, and it is an important topic for researchers. Here we are concerned with the Western sector of the Indo-Pacific trade, from the Red Sea and Persian Gulf to the Palk Strait. Fustat, Siraf and Mantai were all on this route, while Nishapur was on the parallel Silk Road.

It is clear from what we have seen that some beads were locally made, while others were imported. Among the imports are five bead types which were found at all four sites and constitute the staples in the Muslim sector of this trade. They are: 1) coral, from the Mediterranean and sold especially in Alexandria and Fustat; 2) lapis lazuli, from northern Afghanistan, whose lapidary center is not yet identified; 3) gold-glass beads, some of which were probably made in Egypt; 4) carnelian, from western India; and 5) onyx from the same source.

A site's role in trade may be determined by the degree of participation in each of four activities: importing, exporting, producing, and consuming. These categories are not mutually exclusive. An importer may reexport beads, and a producer may make beads for local consumption only. The sum total of these activities reveals how involved in trade a site was.

Mantai was primarily a bead producer, and well over 80% of the beads were made there; 83% of them were Indo-Pacific beads, mostly for export. Fustat exported beads (coral and the fused rod beads), but also imported semiprecious stone beads; only the faience was likely for local consumption. Both sites were active in the bead trade, importing for local use as well as reexporting and making beads for export.

Although statistics from Fustat are not reliable, and the analysis for Mantai is not complete, we may compare the patterns of bead trade between Siraf and Nishapur. The figures in Table 2 are based on the following assumptions: 1) beads imported to a site were usually consumed there; 2) local manufacture includes jet and faience from Nishapur; 3) beads made for export include *Conus*-shell tops at Siraf and soda-etched carnelians at Nishapur; and 4) the Indo-Pacific beads at Siraf were made at Mantai and were to be sent to Africa, as Siraf had trade relations with both places, and these beads are very scarce in Iran (none were found at Nishapur, and they are rare on the antiquities market; personal observation).

Table 2. Characteristics of the Bead Trade at Siraf and Nishapur (in percent of total bead assemblage examined).

Characteristic	*Siraf*	*Nishapur*
a. Locally manufactured	10.5	53.6
b. Imported for consumption	47.8	27.7
Total locally consumed (a+b)	58.3	81.3
c. Manufactured for export	2.8	0.9
d. Imported for Reexport	18.9	0.0
Total for export (c+d)	21.7	0.9
e. Unclassified	20.6	17.8
Total involved in trade (b+c+d)	69.5	28.6

Considering the figures in Table 2, and bearing in mind the roles of Fustat and Mantai, we may tentatively conclude that the Indian-Ocean route was more heavily involved in the bead trade than was the Silk Route, represented by Nishapur. We may also note that, except at Mantai, there are no beads in the sector that can be identified as East Asian, although a Fustat Fused Rod Bead did go the other direction.

A special trade pattern has been identified at Siraf: Indo-Pacific beads being transshipped from Mantai to Africa. The *Conus* shell tops may also have been part of this trade. These became important trade items in East Africa, a trade which preceded the Portuguese (Harding 1981), and which may well have been in the hands of Arabs, as may have shell columella beads, though not *Conus* columella (Schofield 1958: 185). The possibility of Siraf making these beads at the opening of this trade should be investigated further.

At Nishapur another pattern is seen in the recovery of both amber and soda-etched carnelians; the only site where either were found. The Sasanians and Early Islamic Persians outflanked the Romans and Byzantines to trade with Russia and the Viking world (Frye 1972: 266-267; Harper and Meyers 1981: 22-23). Silver plate with Sasanian motifs and soda-etched carnelians were traded for furs, dried fish, wax, honey and amber. Nishapur was a link in that trade.

Istakhi said in the 10th century of Siraf: "The imports are aloes wood (for burning), amber, camphor, precious gems, bamboo, ivory, ebony, paper, sandalwood, and all kinds of Indian perfumes, drugs, and condiments" (Sastri 1937: 437). All these products, except amber, would have come from India or further east. Ebony and ivory also come from East Africa, which also produces copal, often mistaken for amber. Unless it is Burmese amber, Istakhi's amber might be something else entirely, such as ambergris, lac, or Chinese or Korean copal. If this were Baltic amber, it would have been the only bead product to have come from western Europe at that time.

Finally, we must consider who actually moved the beads around the region. At the eastern terminus (Mantai), we have the comments of a Chinese and two Western observers. Fa-hsien (A.D. 414) said that the Sa-bo, that is Sabeans or Sea Arabs, controlled the trade. The historian Procopius recounting the Emperor Justinian's experience (525 to 565) and the traveling monk Cosmos Indicopleustes (ca. 550) both said that the Persians controlled the trade (Francis n.d. b). The Buddhist pilgrim Kanshin (Kien-Tchen) noted ships around Canton about A.D. 750 coming from India, Malaysia and Persia (Takakushu 1929: 446).

The Muslim literature testifies to the ports serving this trade. Most striking is the commentary of Masudi in the 9th century, as he repeats like a mantra the names of Siraf and Oman (Muscat) in three passages. He tells us that they sailed on the seas of China, India, Sind, Azania (Africa), Arabia, Erythraea (Red Sea), and Abyssinia. They went as far east as Kedah and Java and as far west as Sofala and Zanzibar (Hasan 1928: 125, n. 3-5).

To summarize, the carriers and traders of most of the beads we have examined are likely to have been the mariners on either side of the Persian Gulf, and Siraf in particular. The assemblage of beads from Siraf fits this pattern well.

THE USES OF THE BEADS

Unless beads are found in specific contexts (e.g., burials), their uses in the systemic context of a site may be hard to discern. We often rely on a knowledge of the cultural background of a site to help us understand how beads were used. Locational analysis will also prove useful.

No formal locational analyses have been done on the sites in relation to beads. Siraf and Mantai are expected to be published soon, and work may be done on them at that time. Even now, however, the interim reports on Siraf by Whitehouse (1968-1975) allow us to form some hypotheses regarding the find-spots of the beads.

Beads were uncovered in nearly every trench at Siraf, but not evenly distributed. Four loci (called "sites" in the reports) had no beads, while Locus J, a military warehouse, had only one. On the other hand, Locus B, the site of the "Great Mosque," contained over half the beads examined.

Why was there a concentration of beads at the mosque? For one thing, the area was occupied for a long time. The mosque was built on the site of a Sasanian fort, and at least three beads are actually Sasanian seals, one of which may have been an amulet (Francis 1988b). The mosque was built in five stages (Whitehouse 1970: 2-8) and many beads may well have been in the infill of walls. Moreover, this area was extensively excavated.

All the wasters of a conch-bangle industry and half the shell beads were found around the mosque, suggesting that a bangle- and beadmaker worked nearby. Only a quarter of the Indo-Pacific beads were found here, but 80% of the segmented beads were. This may be because the Indo-Pacific beads were involved in international trade, while segmented beads were consumed or sold locally. Both coral beads and all eight examples of a particularly well-made segmented bead (Fig. 3,b) were found around the mosque. Both would have served well on prayer strands.

Mosques are well-known as sites of bead marts; Mecca is a famous example. It is not too much to expect that Siraf's Friday Mosque, dominating a city with international connections and streams of visitors, would have shared shade with small bead shops, as the expression goes in Persian.

Another approach to understanding these beads is offered by ethnography. The widespread belief in the Evil Eye (Maloney 1976) is quite strong in modern Iran. The Eye, which certain people possess, brings misfortune to anyone caught by its first glance. The Qoran echoes this belief. "The Pen" (Surah 68, lines 51-54) has been interpreted as saying:

> The unbelievers wellneigh strike thee down
> with their glances, when they hear the
> Reminder, and they say, "Surely he is
> a man possessed!" (Arberry 1964: 601-602).

Precautions against the Eye are obviously prudent. One may attract it to something not harmed by its glance or repel it. In Iran one is told to wear a cowrie (*Bibin Tarak* or "eye cracker"), brown agate, carnelian or onyx, anything blue, or anything resembling an eye (Allgrove 1976: 45; Budge 1961: 301-320; Spooner 1976). These things attract the Eye. To repel it, one pokes it out with a hand, a star, a crescent, horns, a phallus or the like.

Many beads from Siraf and Nishapur have one or more eye characteristics: 44.2% of those from Nishapur and 30.4% from Siraf (36.1% when the spindle whorls are included). Every one of these beads may not have been selected primarily as an eye amulet, but given the strength of the superstition, it was probably at least one factor in their selection.

A large group of eye amulets is composed of blue faience beads. The only advantage these crude and poorly-made beads have is that they are blue. They hardly ever seem to have been exported, and they are so badly made that one doubts that even the poor would wear them. Similar modern beads are never worn by people, but put on livestock, which is especially susceptible to the Eye. It is probable that this was also their older function.

In some cases particular shapes or materials can help us identify the uses of beads:

1) *Cornerless Cubes of Green Jasper*. Schienerl (1985) called attention to this bead, suggesting that it was an eye amulet among Bedouins. The bead was known in Iran (Francis 1986a), but its excavation at Siraf places it in an Early Islamic context. Similar beads and a green jasper heart pendant are in the King Fouad collection from Fustat (Pl. ID, bottom of upper strand). None of this tells us if they were amulets (Fig. 2,d).
2) *Charm Case Beads*. Metal tubes containing written charms were worn as early as the XII Dynasty in Egypt. In Roman times they were hung horizontally, and in the Islamic Period square packs, sometimes of leather, were introduced (Petrie 1914: 29; Schienerl 1980). Solid beads shaped like charm cases may have been an eastern Is-

lamic development; a carnelian specimen is known from 7th-8th-century Dwarka, an early Muslim community in India (Deccan College Museum, personal observation). There were four such beads at Nishapur (Fig. 2,e). A bronze one resembled the leather pouch, while those of jet, green "Abassabad stone" and rock crystal hung horizontally. The role of doubly-terminated quartz crystals in developing this style (Keen 1986: 30; Jenkins and Keene 1982: 26) is questionable.

3) *Paired Tube Beads.* These are usually made of two wound tubes of glass, one smaller than the other, joined along their lengths. They are most common in Persia. Smith (1957: 222) thought that they might have been charms, but their use as spacer beads and whether they hung from the larger or smaller tubes has been debated. We are now a bit closer to the answers. At Nishapur, a paired tube bead cut from a soft red stone could only be strung through the smaller loop, as the other tube was left solid (Fig. 2,f). A black-glass specimen with red, yellow and white-line decoration found at Chong-tim by Aurel Stein (1921: Pl. IV; British Museum acc. no. MAS 1120) indicates use as a charm case, since the larger tube was closed at one end only.

4) *Flat Pendants of Badaghoria Agate.* These distinctive large flat pendants are shaped like an ellipse with "shoulders" at the top and bottom (Fig. 2,g). There are several variations, but they are nearly always made of Babaghoria agate, a grey- or brown-and-white agate from western India, named after the patron saint of the industry (Francis 1986b).

Budge (1961: 68, Pl. VI) thought the pendant to be special to Shiite Muslims. They were once thought to be Moghul in origin (Francis 1979a: 73), as a coin in this shape was issued by Akhbar in 981 A.H. / A.D. 1573 (Gupta 1979: Pl. XXVI, no. 274), and it was popular for Moghul jades (Brunel 1972: Pl. 67). The Bohemians imitated these in glass (Francis 1988c: 39, Pl. G.3). Nishapur puts the shape into an Early Islamic context. Not only was a pendant found, but one was represented on a stucco figure dating from the mid-8th to mid-9th centuries (Wilkinson 1986: 262, Fig. 4.3). An unfinished pendant of steatite in this shape was also recovered. Though associated with Islam, the origin and meaning of this peculiar shape are not fully understood.

5) *Faience Disc Amulet Pierced with Holes.* This amulet is well known in the Islamic world and thought to be derived from Roman prototypes (Schienerl 1982). They are round discs with holes punched into the face, today usually six holes surrounding one. One amulet from Siraf has this configuration, but two others have only two holes, and one from Nishapur has six holes.

6) *Prayer Strand Beads.* Muslim prayer strands usually have 33 or 99 beads upon which the names of Allah are recited. The beads are rarely distinguishable from other beads. At the end of the strand, however, usually hangs a long *Imam* bead. One of faceted carnelian (Fig. 2,h) has been noted in the Nishapur material (Jenkins and Keene 1982: 30). Three stud-shaped beads from Siraf in bright opaque yellow glass (Fig. 2,i) are similar to old style Imam beads made in Purdalpur, India (personal observation).

7) *Spindle Whorls.* These are small objects used to lend weight to a stick or spindle to give momentum while spinning thread. Typologically, they must be evenly balanced around the axis of perforation, and they are usually uneven in profile (Liu 1978). At present, they are often strung with or confused with beads; the question is, "How were they regarded in the past?" (Francis 1988b). Scanlon's (1988: pers. comm.) discovery at Fustat of a hempen (?) string with a glass mosaic bead and three highly decorated bone or ivory spindle whorls is important in showing that at least in some cases they were worn (Corning Museum of Glass, acc. no. 71.11.1).

Time did not permit the cataloguing of the many spindle whorls at Nishapur. At Siraf they were an important group, with 39 of bone or ivory (9.7% of all objects studied), six of glass (labeled "abacus beads"), and one of low-grade amethyst. Most of the bone and ivory ones were decorated with zones and circle/dot motifs. Five had birds, with heads made by adding a beak to the circle/dot (Fig. 2,j), and three had trees. An ivory one bore traces of ochre, and a bone one had an iron pin stuck in the perforation.

THE DISPOSAL OF THE BEADS

The last human act in which most beads are involved is their transfer out of the systemic context. The implications of this have not been much considered (but *see* Schiffer 1971), but in terms of beads it promises to be rewarding. These preliminary remarks are presented here in hopes that this topic may generate more discussion.

Beads leave the systemic context in one of four ways: 1) purposeful deposition, as in burials, foundation deposits, or caches; 2) purposeful discard when broken, heavily worn, or out of favor; 3) loss; and 4) abandonment. Collectively, we shall refer to these processes as "transfers" from the systemic to the archaeological contexts.

Deposition and abandonment are static events, usually happening only once, while loss and discard are diachronic, resulting in an accumulation of beads over time. Loss and abandonment have built-in negative feedback, as scavengers recycle beads into the systemic context. Since larger, more showy and more valuable beads are most likely to be curated and scavenged, the usual excavated assemblage of beads is poorer in these attributes than the group of beads worn during the life of a site. Conversely, purposely deposited beads are often the best ones available (Francis n.d. c).

Although loss and abandonment probably account for the bulk of excavated beads, only those deposited or discarded (especially when broken) can be recognized archaeologically and treated statistically, at least at the moment. At none of our sites was purposeful deposition noted, except at the cemetery at Siraf and the coral cache at Fustat. All sites had broken beads, and rather than deal with the number of beads involved, it may be more significant to compare the rate at which they accumulated in the assemblage. This can be calculated by using the formula

$$\text{T.D.} = \frac{b}{ty} \times 10^4$$

in which "T.D." is the rate of Transfer by Disposal, "b" is the number of broken beads in the assemblage, "t" is the total number of beads, and "y" is the number of years the site was occupied. The results of computing the rate for Siraf, Nishapur and the imported beads at Mantai are presented in Table 3.

Table 3. Rate of Transfer by Disposal (T.D.) of beads per century.

Site	*Broken beads*	*Total beads*	*Years occupied*	*T.D.*
Siraf	25	251	c. 500	1.99
Nishapur	19	684	c. 600	0.46
Mantai	34	223	c. 900	1.69

The rates for Mantai and Siraf are quite close, while those for Nishapur are much lower. This may not be because beads were curated better there, but because the excavation techniques of someone digging for an art museum 50 years ago were not as likely to uncover or be concerned with fragments of broken beads as are those of modern excavators.

INTRUSIONS

Few bead assemblages are not contaminated with later intrusions. Beads are small and very portable, and modern villagers throw their refuse on ancient tells. Especially common are European glass trade beads of the last five centuries.

At Fustat, many Venetian (Pl. ID) and a few Bohemian beads were collected and are now in the Islamic Museum. Until recently, several large (up to 4.5 x 6.2 cm) seven-layered chevrons were displayed as being Fustat material. The staff is now convinced that they are Venetian from around 1480 to 1580 or so.

At Nishapur intrusions also caused some confusion. A few have been published by the Metropolitan Museum, and others were until recently on display in the Nishapur Gallery. Some 3.3% of the assemblage consisted of intrusions. This was less a problem at Siraf, where under one percent of the beads were modern, with the one made of plastic being recognized by the excavators.

This is not the place to discuss all possible intrusions and their consequences. Excavators cannot be expected to recognize them; this is the task of the bead researcher. Even if one is interested only in older beads, it is necessary to know something about the history of styles, advances in glassmaking, and changes in beadmaking techniques.

EARLY ISLAMIC BEADS IN THE INDIAN OCEAN TRADE: TOWARD A SYNTHESIS

The four sites discussed in this paper were studied as part of a larger project involving the bead trade of the Indo-Pacific region. They may also be considered a unit in themselves, representing the Early Islamic Period.

The bead trade was lively at these sites. Mantai and Fustat were beadmakers, often producing for export, and Fustat and Siraf were both transportation hubs. Only Nishapur was basically a consumer of largely locally-made beads. The bead trade seems to have been more active along the sea than the land routes between East and West.

Although international in scope, trade was selective. There is no evidence for trade with western Europe and little with the Far East. Europe was shunned for ideological reasons, while Mantai, and not the Islamic world, was the point of contact with the East. Yet, the Islamic sites traded extensively: with East Africa, Northern Europe (Scandinavia and Russia), and the Indian subcontinent. The five staples in the bead trade — coral, gold-glass, lapis lazuli, carnelian and onyx — were available at the fringes of the Islamic world. Shortly after the 12th century, Muslims gained control of the western-Indian agate-bead industry by taking over both the sources of the stone and the lapidaries (Francis 1986b).

Trade is not the only human activity which may be better understood through a study of beads. Many beads discussed here have ideological content, especially at Nishapur, with its many potential eye amulets, several charm case beads and two of the peculiarly-shaped flat pendants of Babaghoria agate. Moreover, many jet beads had Arabic inscriptions, and the designs on the soda-etched carnelians probably had significance.

At Siraf there was a marked difference. Save for the yellow glass *Imam* beads, none were clearly Islamic in character. There were no charm case beads, Babaghoria pendants, or beads with Arabic inscriptions. They are typical Early Islamic beads, but not especially Muslim in character. This may support Whitehouse's (1974: 29-30) hypothesis that the population was mostly non-Muslim or nominally Muslim, a situation favored by the Buyid dynasty, with its emphasis on reviving the pre-Muslim glory of Persia.

One important lesson to be draw from this study is the role Early Islamic society played in providing a link to, rather than a sharp break from, the earlier Classical Age (Huzayyin 1942). Three beadmaking technologies which had been assumed to have died out upon the coming of Islam (glazing quartz, soda-etching carnelians, and making faience) are now understood to have been given premature obituaries. The continuity between the Classical and Early Islamic Periods causes problems of ascription, some of which have been partially resolved here, as with the green jasper cornerless cubes, the torus folded bead, and the Fustat Fused Rod Bead.

Our overall impression is one of self-sufficiency among the sites in the Islamic sector of the Indian Ocean trade. Some of these sites were beadmakers or controlled important aspects of the bead trade. Siraf and other ports were responsible for actually moving the beads from one place to another. The Early Islamic world controlled the sources of the staples of the bead trade (carnelian and onyx falling into their hands a bit later). The region traded widely but selectively, importing few beads from outside and being responsible for many of its own beads traveling widely.

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BEADS AS CHRONOLOGICAL INDICATORS IN WEST AFRICAN ARCHAEOLOGY: A REEXAMINATION

Christopher R. DeCorse

Drawing primarily on data obtained from recent excavations at Elmina, Ghana, this report examines the potential use of beads as temporal markers in West African archaeology. It is argued that although beads from West-African contexts are difficult to date, they provide more information than has previously been suggested. The Elmina beads are of particular interest as they can be closely dated by associated European trade materials. Preliminary results from the analysis of the 30,000 European and locally-made glass beads are discussed and findings from other West-African sites are evaluated.

INTRODUCTION

In 1972, Lamb and York wrote an article entitled "A Note on Trade-Beads as Type-Fossils in Ghanaian Archaeology." (Lamb and York used the term "type-fossil" to suggest the possible use of beads as temporal markers. In a strict palaeontological sense, "type fossil" refers to a taxonomic exemplar and connotes no chronological sensitivity.) Although the focus was on Ghanaian beads, their comments had implications for the entire West African region. The authors had a bleak opinion concluding that "the usefulness of glass beads as type-fossils in archaeological contexts is minimal" (Lamb and York 1972: 109). In light of almost two decades of research, a review of Lamb and York's conclusions is appropriate. While the dating of West African beads does pose special problems, research outside of Africa and recent excavations at Elmina, Ghana, suggest they perhaps hold more promise than was previously thought.

DATING WEST AFRICAN BEADS

The major problems faced by researchers in West Africa are the potentially great ages and the extended life spans of the beads that they recover in archaeological and ethnographical contexts. Even in North America, where a great deal more research has been undertaken, the dating of European beads of the past 500 years is problematic. However, the importance of beads was well established in West Africa long before the arrival of the Europeans on the coast at the end of the 15th century A.D. Bone, ostrich-shell and metal beads have been recovered from many Late Stone Age and Iron Age contexts, and there appears to have been a trade in stone beads in the western Sudan by the first millenium A.D. (e.g., Connah 1981: 194-195; McIntosh and McIntosh 1980: 162; 1986: 430).

Glass beads found their way to West Africa prior to the 15th century via the trans-Saharan trade with North Africa (Fig. 1) and some indication of their importance in West Africa can be found in the writings of Arab travelers of the 12th to 14th centuries (Levtzion and Hopkins 1981: 128, 130, 169, 179, 287). The trans-Saharan trade was well developed by medieval times but most likely existed much earlier, if only on a limited basis. Depictions of chariots in Saharan rock art and occasional documentary references suggest that some contact probably occurred during the 1st millenium B.C. (e.g., Garrard 1982: 444-446). It is likely that the advent of the camel in the 1st or 2nd century A.D. greatly facilitated trans-Saharan transport and the origins of a regular trade may be traced to this period. Because of these early contacts, the mere presence of glass beads does not provide an immediate temporal marker for the age of European expansion.

While beads and other trade items undoubtedly reached West Africa in significant quantities before the arrival of the Europeans, positive identification and dating of these materials is often difficult within

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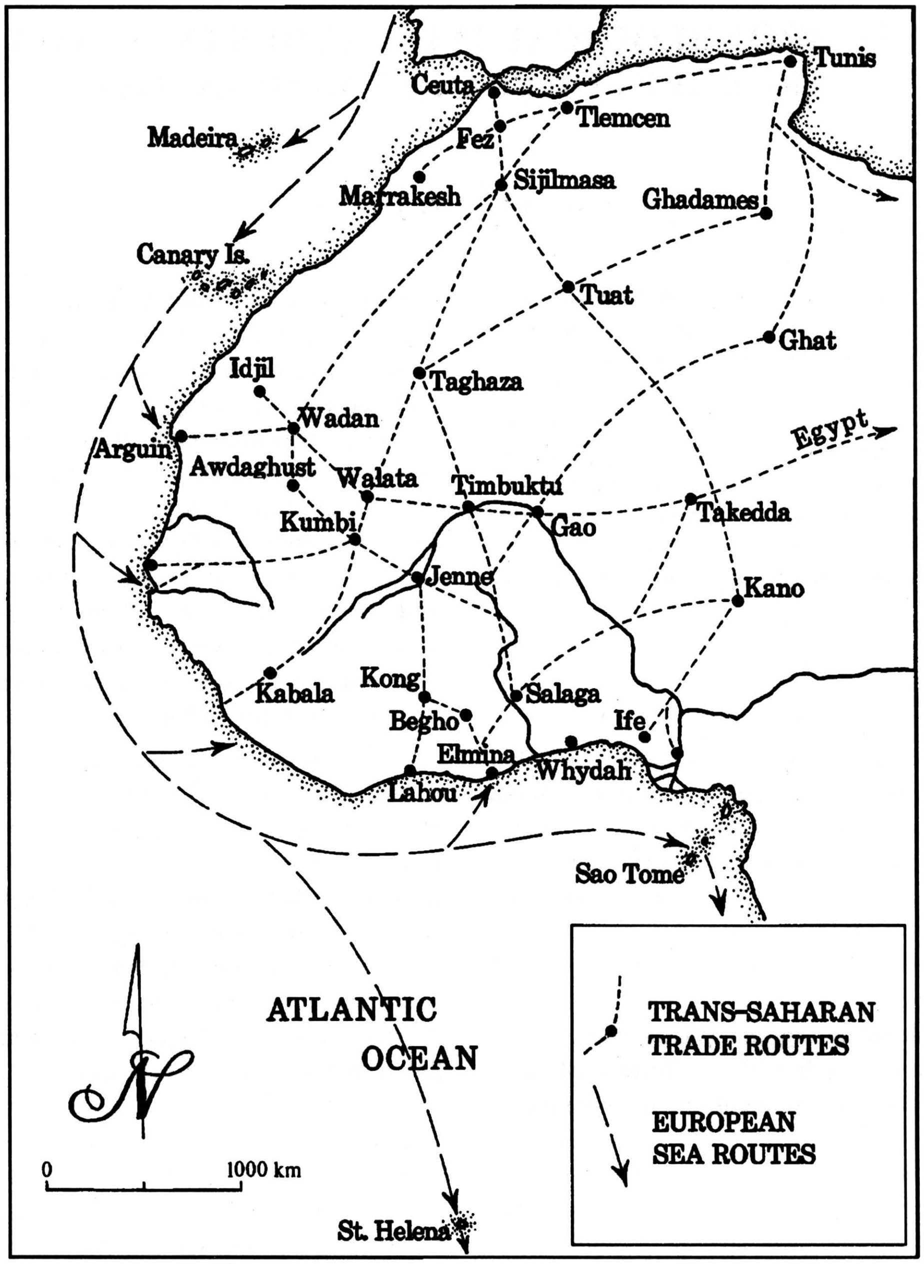

Figure 1. Map of West Africa (*see* MacIntosh and McIntosh 1980: 70; Garrard 1980: 33) (drawing by D. Kappler).

an archaeological context. The site of Igbo-Ukwu, Nigeria, excavated by Thurstan Shaw between 1959 and 1964, illustrates the difficulties. Actually three discrete areas designated Igbo-Richard, Igbo-Isaiah and Igbo-Jonah, the site yielded a spectacular assemblage of bronze, copper and iron objects, and over 150,000 glass beads. Chronology was principally provided by five radiocarbon dates (Shaw 1970: 259-262; 1975). Four of these dates cluster in the 9th and 10th centuries A.D., while the fifth was 505±70 B.P., which provides a calibrated date in the 14th or 15th century A.D. The early determinations were questioned as being too old, and Lawal (1973) contended that the presence of *manillas* and the large number of glass beads argued for a much later, post-European-contact date (Posnansky 1973: 310; cf. Shaw 1975). However, more evidence for long distance trade in the Sahel during the first millenium A.D. and three new dates from Igbo-Ukwu tend to support Shaw's original ca. 9th-century assessment (McIntosh and McIntosh 1986: 433-434; Posnansky 1980).

It is frustrating that the beads were not helpful in resolving the controversy. Most are simple monochromes, and others bear at least a superficial similarity to European imports that could have reached West Africa by the end of the 15th century (i.e., Shaw's types W and X). The bead distributions varied between the three areas, possibly supporting the suggestion that they are not contemporaneous. Chemical analysis of the beads was of some help in identifying their origin. Shaw (1970: 259) initially suggested that they were largely of Indian or possibly Venetian manufacture. However, neutron activation and x-ray fluorescence analysis indicated that a Near-Eastern or Islamic origin was more likely if the beads were ca. 9th century in age, while Near-Eastern or European origins were equally likely if they dated to the 15th century (Davison 1972: 311). On the basis of their similarity to beads from Ingombe Ilede, Zambia, Shaw (1970: 259) used the beads to support the 9th-century date. However, the Ingombe Ilede beads, initially believed to date to the 9th century, are now known to date to the 14th or 15th century (Phillipson and Fagan 1969). It is notable that the collection is *not* comparable to assemblages from 16th- and 17th-century Spanish trade sites in the New World (cf. Deagan 1987: 116; Fairbanks 1968; Liu and Harris 1982; Mitchem and Leader 1988; Smith 1983; Smith and Good 1982; Wray 1983). Early New-World trade beads such as the Nueva Cadiz plain and twisted types have been noted in non-archaeological contexts in Mali (Elizabeth Harris 1989: pers. comm.).

The occasional beads recovered from other protohistoric West African sites have proven equally unhelpful as chronological indicators (e.g., Mauny 1949a; McIntosh and McIntosh 1980: 164; cf. Sutton 1982: 414). As Lamb and York (1972: 110; cf. Lamb 1969; 1971; 1978; Shaw 1961: 74-79) noted, the long ancestries of some beads make it difficult in some cases to positively separate beads of 4th-century Roman origin from those of 17th-century Dutch manufacture.

The confusion between pre- and post-European beads is complicated by the fact that the first European traders on the coast probably made a conscious effort to offer items for which there was already a demand. Their arrival did not create new trade patterns, but utilized and expanded existing networks. However, trade was increasingly redirected away from the long-established trans-Saharan trade toward the new frontier of opportunity provided by such coastal sites as Lagos, Whydah and Elmina. A greater variety and quantity of goods was offered, including an increasing number of bead types. However, as Shaw (1975: 510) pointed out in his discussion of the Igbo-Ukwu material, not enough is known about trade patterns during the relevant centuries to be certain which bead types were introduced at particular times. It is possible that at least some of the beads arriving via the trans-Saharan trade and early European trade beads were from the same sources.

There are references in European documents regarding the importance of beads in West African societies. However, these references are of little practical use in dating examples recovered archaeologically. Terms such as *madrigettes, paternosters, contoir-teeckens, olivetjes,* and *aheyne coffé* are difficult to equate with specific bead varieties (e.g., Bosman 1967: 120; de Marees 1987: 34, 53-56, 80; Hemmersan 1983: 109; Müller 1983: 204-206, 214; Van Dantzig 1978: 82). Adam Jones and Albert Van Dantzig have noted that the majority of European beads brought to the Guinea Coast were probably drawn beads from Murano (de Marees 1987: 53, fn. 8). Beyond the simple listing of beads as trade items or as types of adornment, the only early writer that provides helpful information seems to be de Marees, whose early 17th-century account of the Guinea Coast influenced a number of later writers (Jones 1986).

The problems faced in interpreting these early documentary records are illustrated by *akori* beads. They are variously known as *coris, accary, akori, aigris* and *aggrey*, and it has been hypothesized that they were glass, coral, carbuncles, stones or iron slag, but positive identification of the "original" *akori* bead remains difficult. Whatever the original meaning of the term, it probably became more generalized and gained different meanings through usage (Bovill 1968: 26-27; Davison 1970; Davison, Giauque, and Clark 1971; Fage 1962; Jeffreys 1961; Kalous 1966; 1979; Krieger 1943; Landewijk 1970; Mauny 1949b; 1958).

Documentary records also have been of limited use for determining bead sources. Many European traders obtained goods from middlemen, and withouty adequate documentation it is difficult to trace their ultimate origin. Significant amounts of 16th- to 18th-century Chinese porcelain, brought by European traders, have been recovered from African sites and it is possible that there was also a trade in Oriental glass beads. Carnelian beads have been found in both Iron-Age and historic-period contexts in West Africa at sites such as Igbo-Ukwu (Shaw 1970: 230) and Elimina, Ghana. As no African source has been identified, they were presumably imported from other areas, possibly India (David Killick 1989: pers. comm.). Trace element analysis has thus far been of limited help in sourcing beads from African sites but further research in this direction may provide more information (Davison 1972; Davison and Clark 1974; cf. Karklins 1974; Sleen 1973). In particular, David Killick (1989: pers. comm.) has noted that major element analysis, especially of colorants, may prove very helpful. A study by Davison, Giauque and Clark (1971) successfully defined two groups of blue-green dichroic glass beads found in West Africa. The two groups seem to be respectively associated with Arab and European trade.

The social importance of beads in West Africa further complicates their dating as they may continue in use long after their manufacture (e.g., Cole 1975; Sackey 1985). In the past ten years, I have observed a variety of 19th-century bead types in use in ritual contexts in both Ghana and Sierra Leone. Lamb and York noted several beads they believed could range in age from the 4th century to the 19th century which were readily available in Ghanaian markets in the early 1970s (Lamb 1978; Lamb and York 1972). I examined beads for sale in Accra, Ghana, during 1987, and found that comparable beads, as well as others identical to examples recovered from 19th-century archaeological contexts, are still available. Ghanaian markets perhaps provide the greatest variety of antique beads in West Africa, but other examples of old beads can be readily found in markets in Sierra Leone, Ivory Coast, Gambia, Togo, Nigeria, Mali and probably other West African countries. Sellers will sometimes indicate that beads have been dug up as a further recommendation of their age and worth and when pressed, some sellers I interviewed admitted to the association of the beads with burials.

A final difficulty in the study of beads as chronological indicators rests with the African material recovered. African sites have generally not produced large collections of beads and few are from closely-dated contexts. In publications, the description of many of these finds remains very basic, or nonexistent, making it difficult to compare types. Exceptions are Shaw's (1961; 1970) thorough discussions of the Dawu and Igbo-Ukwu material, though comparison is still difficult, and the Picards' recently-initiated and extremely well-illustrated series on West African beads collected from non-archaeological contexts (Picard and Picard 1986, et. seq.).

Unfortunately, despite the problems in using beads as chronological indicators, they often provide the only clue when dating sites of the second millenium A.D. Beads are sometimes the only imported commodity found, even on sites known to have been occupied to the present century. The increasing use of radiocarbon dating and the recent refinement of high precision calibration curves have been very helpful in establishing regional chronologies (McIntosh and McIntosh 1986). However, when dating sites of the past 500 years, standard deviations are too great to provide more than the broadest parameters. Even on older sites, the development of a bead chronology could assist in the evaluation of radiometric dates.

Bead research in other parts of the world, use of the Kidds' classification system, and the publication of trade-bead catalogues has facilitated the study of beads by Africanists (Karklins 1985; Karklins and

Sprague 1980; 1987; Kidd and Kidd 1983). Recent work by David Killick (1987) suggests that beads in southern and eastern Africa have similar temporal distributions to trade beads in North America during the 19th century but notes that there may be a time-lag in the appearance of new bead types during the 17th and 18th centuries. These findings suggest that the dating potential of beads from West African sites should not be negated, but carefully evaluated in terms of the data available from other parts of the world.

EXCAVATIONS AT ELMINA, GHANA

Recent excavations at the old African settlement of Elmina, Ghana, provide a unique opportunity to examine the temporal distributions of European glass trade beads in West Africa, as well as locally made beads of stone, shell, brass, ivory, bone and glass. Archaeological research was carried out at the site between September 1985 and December 1987 (DeCorse 1987a; 1987b). Elmina is of special interest as it was a major trading center between 1482, when the Portuguese founded Castle Sao Jorge da Mina, and 1873, the year the African town was destroyed by the British. The Castle was captured by the Dutch in 1637, and it remained the headquarters of Dutch mercantile interests on the Guinea Coast until the transfer of all Dutch properties to the British in 1872. There was an African settlement at Elmina prior to the arrival of the Portuguese in the 15th century but the settlement expanded rapidly as a result of its advantageous trading position. By the time the settlement was destroyed in 1873, the population probably numbered over 12,000. Survey and excavation at the old town site located over 30 structures and recovered a large assemblage of local and imported artifacts spanning the 16th to the 19th century.

Analysis of the more than 30,000 excavated beads is incomplete, but it appears that the extensive assemblage of European trade materials will provide more precise dating than is usually possible on African sites of the last 500 years. Beads were among the most ubiquitous finds at the site, and they occurred in hundreds of different contexts. Many of the recovered beads were from the 19th-century destruction layers, including many that were partially melted, possibly having been stored in a trader's house destroyed during the 1873 British bombardment. Midden deposits, fill layers, burials, and house floors account for other occurrences. Many of these deposits can be dated on the basis of associated finds of European ceramics and glass, the dates of which are frequently known within a few years. This close chronological control provides a means of determining the temporal distributions of different bead varieties and assessing their value as chronological indicators. Preliminary examination of the Elmina collection indicates that some beads should be useful in establishing a *terminus post quem* for archaeological sites. Others may prove useful when subjected to the same seriational studies used on other artifact classes.

Comparison of some of the Elmina beads with relatively well-dated examples from catalogues and other archaeological sites indicates that they are of similar age. Research by Karlis Karklins on the "Levin Catalogue" and the "Venetian Bead Book" was particularly useful. The former is of special interest to Africanists as it contains examples of beads described as being used by traders in West Africa. Both of these bead collections were examined by Lamb and York (1972: 112) but at that time the Venetian Bead Book was erronously assigned a date of ca. 1704. Karklins (1985: 31, 81) has placed the date of the Venetian Bead Book in the middle of the 19th century, or slightly earlier, and the Levin Catalogue between 1851 and 1869. Because the collections contain similar bead types, Lamb and York postulated long periods of manufacture for some of the beads they examined. Had they known the correct date of the Venetian Bead Book, they may have reached different conclusions. Other 19th-century catalogues have been discovered and these also provide useful comparisons. These include bead cards from the Glass Museum on Murano, Italy, the Giacomuzzi bead sample book presently at The Bead Museum in Prescott, Arizona (Francis 1988; Karklins 1984), and three sample cards in the collections of the Museum of Cultural History, University of California, Los Angeles.

Beads similar in style and manufacture to examples in these trade cards and sample books were recovered from 19th-century contexts at Elmina. There is, however, more variation in the archaeological collection. (Whenever possible, the beads are given Kidd and Kidd [1970] type/ variety codes; varieties that do not appear in their lists are marked by an asterisk [*].) The cylindrical, opaque barn-red bead, decorated with white loops with a light gold dot in their center (Pl. IIB, R.1, #1), appears identical to beads in the Levin Catalogue: WIIIb*(f). Other WIIIb-type beads with the same color combinations but different body shape were also recovered, including small cylindrical; tubular, square-sectioned; large cylindrical; round; short barrel; and short cylindrical with convex ends (Pl. IIB, R.1, #2-7, respectively).

Additional beads pictured illustrate the wide variety of additional color combinations present within the WIIIb-type category. Plate IIB, row 2, from left to right, includes barrel-shaped beads of opaque light gold glass with a transparent bright navy on opaque white on opaque brick red on dark green band around the middle, and blue on white on red dashes on the ends; cylindrical translucent and opaque dark palm green with 15 to 24 "eyes" of transparent bright navy on opaque white on opaque redwood on opaque light gold; cylindrical opaque light gold with 9 oblong striped inlays of transparent bright navy on opaque white on bright navy, and nine transparent scarlet dots; and barrel-shaped, opaque light gold with an opaque brick red on transparent dark green stripe around the middle, and transparent bright navy on opaque white "eyes" in opaque brick-red loops on the ends.

Many of these WIIIb beads were in large concentrations of partially melted beads in 1873 destruction layers. Some are poorly represented in other contexts and may have had a limited distribution. In contrast, the apple-green bicone with compound stripes of light gold, black and barn red occurs in a wide range of 19th-century contexts, in addition to the 1873 destruction debris (Pl. IIB, R.3, #1,2; cf. Levin Catalogue: WIIIc*[k]). Most of the archaeological examples (11-13 mm diameter and 11.5-13 mm length) are smaller and lighter in color than those illustrated in the Levin Catalogue (14.3-16.5 mm diameter and 13.7-15.0 mm length). These beads are still common in Ghanaian markets and I observed several of the beads being worn during the Bakatue Festival at Elmina in 1986.

Research by Lester Ross on a type of 19th-century mould-pressed Bohemian bead indicates that these are also useful temporal markers for the 19th century. Mould-pressed beads had not been well-reported from archaeological contexts in West Africa at the time Lamb and York wrote their article and they did not discuss their potential use as chronological indicators. The Bohemian beads which Ross describes as "mandrel pressed" are characteristically faceted and have a moulded or partially moulded hole (Ross 1974; 1988; Sprague 1985: 96). Ross (1988) suggests that early examples of these beads, dating to the second quarter of the 19th century, had conical holes which were partially punched through at the narrow end of the perforation, leaving a chipped scar. The facets were all ground. Later examples, possibly introduced in the 1860s or 1870s, have a conical hole moulded all the way through and partially-moulded facets. Late 19th- or 20th-century examples are characterized by straight holes extending all the way through the bead, and entirely moulded facets.

Elmina examples are round with an equatorial mould seam and ground facets (Karklins 1985: 101, MPIIa*). All have conical holes which appear to have been partially punched through. However, in some cases the ends have been ground flat making it impossible to determine if they had a chipped scar. The beads occur in black, opaque blue, transparent green, translucent bright turquoise, and transparent red, and in various sizes (Pl. IIB, R.3, #3-8). Such beads were recovered from 1873 destruction debris but were also found in a number of other contexts, including a large fill layer or midden deposit which contained some pre-19th-century material, but produced a mean ceramic date of circa 1846 (n=1148). None of these beads have been observed for sale in markets or in current use.

Mandrel-pressed beads were the most common type of moulded bead found at Elmina, but a number of other moulded beads were also recovered from 19th-century contexts. Two examples are illustrated in Pl. IIB (R.4, #1,2). They are oval-shaped and have ground facets (MPII**). A mould seam extends around the bead parallel to the straight-sided perforation. Techniques for moulding and pressing beads were perfected in the 19th century and machines were in common use by the early 20th century (Sprague 1985: 95-96). The dating potential of the various mould-pressed beads has not been fully explored. As data accumulate from well-dated contexts, they may provide a means of closely dating sites of the last 150 years.

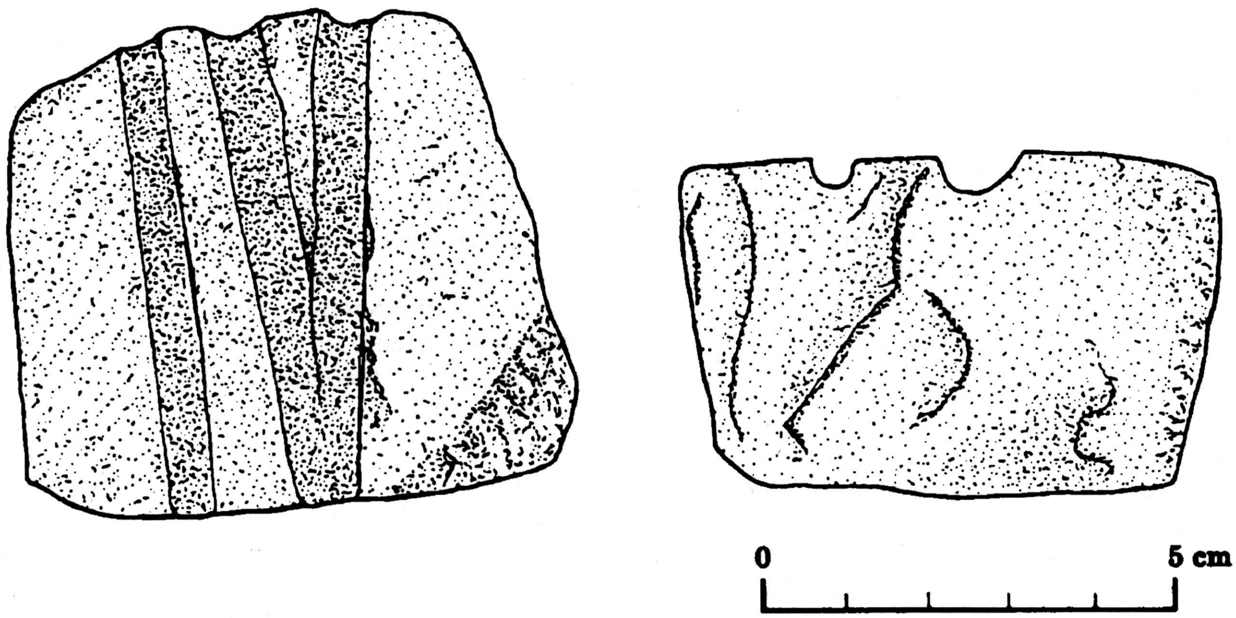

Figure 2. A sandstone bead abrader from Elmina.

The analysis of some of the earlier bead varieties from Elmina has also been completed. Some of these are not common but their presence in well-dated contexts seems to confirm that their temporal distributions are equivalent to those of similar beads found in North America. At Elmina, a wide variety of bead types were recovered from burials dating to between ca. 1700 and 1775 on the basis of associated ceramics. Four of these bead varieties are shown in Plate IIB (R.4, #3-7: IIb18; IIb'7; WId* transparent reddish amber; WIIc2). North-American occurrences of these beads mostly range between 1700 and 1830 (Brain 1979: 105, 106, 108, 110; Quimby 1966: 86-87). Examples of "gooseberries" (IIb18) are also known from ca. 1650 contexts in Florida and Alabama (Deagan 1987: 116). It is of note that "gooseberries" have also been recovered from the ca. 1700 wreck of the *Henrietta Marie*, an independent English merchant ship involved in the African slave trade (Moore 1987; 1988).

Although all four of these bead varieties are mostly known from 18th-century sites in North America, their maximum range probably extends even earlier. All have close parallels in beads produced in Amsterdam during the 17th century (Baart 1988; Karklins 1974; Sleen 1963; 1973). Karklins (1988: pers. comm.), in his examination of material from archaeological sites in Amsterdam, noted variety IIb18 in ca. 1590-1775 contexts; WId* in 1675-1800 contexts; and WIIc2 in 1670-1750 contexts. Given the Dutch presence at Elmina it would certainly not be surprising to find examples of these beads there. As the Dutch bead industry had apparently collapsed by about 1750, the late-18th-century examples of these beads were presumably produced elsewhere, possibly in Venice, Germany, or Bohemia (Karklins 1974: 66).

AFRICAN GLASS BEADS FROM ELMINA

The Elmina excavations also provided information on the local bead industry, which included the modification of imported beads and the manufacture of local products. Little systematic work has been done on the origins and dates of African-made beads, but after further analysis they may prove to be of equal use as chronological indicators. Direct evidence of manufacturing, such as molds or wasters was not found at Elmina, but several grooved sandstone blocks which probably served as bead abraders were recovered (Fig. 2). Similar examples have been found at other Ghanaian coastal sites such as Ankobra, Sekondi, and Winneba. These stones could have been used for polishing imported glass beads, or for grinding local beads of stone, shell or glass. All three of the latter industries survived in West Africa until the present century (Daniel 1937; Shaw 1945; Wild 1937). In fact, glass bead manufacture remains a very active cottage industry today (Pl. IIB, R.7, # 5-8; Lamb 1976; Liu 1974; Sordinas 1965).

Archaeological evidence for local bead manufacture has been found at sites in both Ghana and Nigeria. Posnansky (1987: pers. comm.) uncovered wasters from the manufacture of drawn beads at the Begho excavations which, on the basis of radiocarbon determinations, are believed to date to the 17th or early 18th century. Early evidence for the reworking of beads comes from Ife, Nigeria, where Willett (1977: 16-22) uncovered wasters which he dates to between the 8th and 12th centuries. Beads made from firing powdered glass are best known from ethnographic accounts of Ghanaian craftsmen, but this type of bead is widely distributed in West Africa and several different industries of unknown ancestry are represented (cf. Bowdich 1966: 268; Connah 1975: 167, 170; Delarozière 1985: 41-44; Krieger 1943; Lamb 1976: 34; Sinclair 1939; Sordinas 1964). All of these beadmaking traditions were presumably dependent on imported sources of glass, but there is a tenuous hypothesis that silica slag from iron smelting could have been used for the manufacture of beads (Landewijk 1970: 96; cf. Kalous 1979).

Despite the evidence for early West African bead industries, European writers provide little information. In the early 16th century, the Portuguese purchased *coris* on the lower Guinea Coast and brought them to Elmina where they were polished, drilled and strung for sale. John Vogt considers *coris* to be a type of stone bead in this case (Daaku and Van Dantzig 1966: 15; Vogt 1973: 462; 1979: 70). De Marees (1987: 53, 54, 80, 84), in his early-17th-century account, indicates that the polishing and modification of imported glass beads was a common practice in coastal Ghana. Aside from these notes, and other enigmatic references to *akori* beads, there appear to be no references to the manufacture of local glass beads.

Imported beads which were probably modified locally were recovered at Elmina supporting de Marees' comments. Many beads show evidence of grinding (e.g., Pl. IIB, R.3, #2; R.5, #1-4), and some of the drawn beads appear to have been cut into shorter lengths. The grinding and reworking of beads has been noted in other collections from West Africa (Picard and Picard 1986: 3). The reheating of European beads to alter their color or opacity also seems to have a long history in West Africa (e.g., Davison, Giauque and Clark 1971: 654; Sordinas 1964). At Elmina, the most interesting category of reworked beads is that made by heating glass fragments to the melting point and then perforating them with some type of pointed implement (Pl. IIB, R.5, #2). The majority of these were made from broken European beads, but there are some examples of perforated glass fragments (Pl. IIB, R.5, #3). There are also intact drawn beads with a second hole pushed through, perpendicular to the original perforation (Pl. IIB, R.5, #5). Some bead fragments have smooth perforations, probably made by some type of drill (Pl. IIB, R.5, #4).

A large variety of clearly non-European beads which exhibit a wide range of decorative effects was found at Elmina. Unfortunately, given the current state of research, it is not possible to be certain where these originated. There was an active trade along the West African coast and beads from Nigeria or other areas could easily have reached Ghana (Law 1983). Most of the recovered examples were made by firing glass chips or powdered glass, techniques analogous to the mode of manufacture still used in Ghana. None of the obviously locally made beads were drawn like the examples from Begho, but the collection is still under study.

The two most common types of fired beads are shown in Plate IIB. These represent beads made from glass chips (R.6, #1-4), and beads made from powdered glass (R.6, #5-7; R.7, #1-2). Both types occur in contexts dated to the 18th century, or earlier, on the basis of associated ceramics. The examples made from chips are mostly white and blue, or blue-green glass, but examples with yellow and brick red glass fragments were also found (Pl. IIB, R.6, #1). The perforations in these beads are irregularly shaped and noticeably tapered, similar to the holes in the locally-perforated fragments of imported beads. After perforation, the beads were generally ground. In some examples (Pl. IIB, R.6, #4), the beads appear to have been turned in the mold while still molten and some of the glass has swirled together giving the beads a wound appearance. A few beads seem to have been made by winding viscous shards of glass around a mandrel. Beads similar to these varieties have been recovered from possible 17th-century contexts at other Ghanaian sites, including New Buipe in northern Ghana (Lamb 1978) and Twifo Heman, located 65 km north of Elmina on an important trade route to Kumasi (Bellis 1972: 85).

Perforations in the powder-glass beads are smooth and irregularly shaped. Most of the recovered examples seem to have been light gold in color originally, but weathering has in some cases made them a yellowish-tan. The decorated beads have inlays of trailed glass and/or fired glass chips of pale blue, navy blue, black, white, and brick red. They appear similar to types sometimes referred to as *akosu* (Lamb 1976). They do not have the grey or black core which characterizes the category of beads known as *bodom* (Dubin 1987: 123; Lamb 1976). Examples of this latter type of bead may also have been found at Elmina but they are, as yet, unanalyzed.

Various non-European beads also occur in 19th-century contexts. Some of these are certainly the forerunners of the fired beads still produced in Ghana today, but there are also examples of wound beads of uncertain origin. A type of wound bead is presently made in Bida, Nigeria, but none of the beads examined parallel those from Elmina (Dubin 1987: 123; Nadel 1940). The most ubiquitous of the Elmina varieties are undecorated opaque yellowish-green, barrel-shaped beads (WIb*) of which 690 examples were recovered. These were found in mixed contexts containing both 19th-century and earlier material, but well-dated contexts seem confined to 19th-century features. Some of the beads have well-smoothed surfaces but most are very weathered (Pl. IIB, R.7, #3-4). Future research will, perhaps, clarify the origins of these beads.

BEADS NOT RECOVERED AT ELMINA

A survey of bead types *not* found in the Elmina assemblage also provides some clues regarding the temporal distributions of beads. As more than 400 bead types were found, it is notable that none of the more elaborate, so-called mosaic beads are represented. Their absence may be the result of cultural bias but many of these beads are common in present-day Ghanaian markets where they do not command the same high price as some of the recognizably older beads. As the town's destruction in 1873 provides an excellent *terminus ante quem* for the Elmina material, the absence of the mosaic beads supports Karlis Karklins' (1988: pers. comm.) suggestion that they are primarily 20th-century products. His supposition is based in part on the examination of over 10,000 ethnographic photographs taken in Africa before 1935. In all these photographs, there is only one which *may* show a mosaic bead being worn. In contrast, these beads feature prominently in collections of recent African trade beads (Harris 1984; Shumway 1973).

CONCLUSIONS

The preceeding discussion suggests that the negative conclusions reached by Lamb and York need to be reconsidered. The Elmina site provides a wide variety of beads from relatively well-dated contexts and these data indicate that some bead types of the 17th through 20th centuries may be useful dating tools. Beads may also prove to be helpful in differentiating pre- from post-European-contact sites. While by no means conclusive, comparison of the Igbo-Ukwu beads with material from early Spanish sites in the New World tends to confirm the pre-European context of the former.

Lamb and York examined only six varieties of European trade beads in their 1972 article and a great deal of additional information has come to light since then. Nevertheless, it is still important to consider some of the points they made. The ritual and social importance of beads does, at least in some cases, keep beads in circulation long after their period of manufacture and the full temporal distributions of many beads are still unknown. Occurrences of one or two beads cannot be used to build a chronology for an entire site. As with other dating methods, beads should be only one resource to be considered, and are best used in combination with other techniques.

The data on Elmina discussed here are limited in some respects. As a large portion of the recovered beads is from 19th-century contexts, the absence of less-common bead varieties from earlier periods could be a result of sample size. Furthermore, the factors affecting the distribution of beads in other parts of West Africa are currently unknown and the data discussed here can only be applied tentatively to other sites. Even sites close in both time and space may present quite different bead assemblages. This is illustrated by the beads recovered by Calvocoressi (1977) at Veersche Schans (Fort de Veer), Bantoma. This small redoubt was located at the landward side of the Elmina penninsula and served as part of the western defenses of Elmina town. Calvocoressi's work concentrated on the redoubt but he exposed 15 burials, two of which produced a total of 5199 beads (Calvocoressi 1977: 130). The burials predate the 1811 construction of the redoubt and can probably be dated to the 18th century. Although the beads have counterparts in Elmina assemblages of seemingly comparable age, the relative frequencies are different. The vast majority of the Bantoma beads are small (2-4 mm) or very small (< 2 mm) in size. The wide assortment of large (6-10 mm) and very large (> 10 mm) beads which forms a significant portion of the Elmina assemblage is all but absent. Without more information on the contexts of the beads at both Bantoma and Elmina, it is not possible to determine if this disparity is due to the date of the deposits, or the sex, ethnicity, age, social status or personal preference of the original owners.

Beads exported to different areas of Africa at different times doubtlessly varied. However, some of the Elmina beads are represented at other sites in West Africa. For example, the blue mandrel-pressed Bohemian beads were the most common variety recovered during an archaeological survey of defensive sites around Kabala in northeastern Sierra Leone (DeCorse 1980; 1981). Oral histories and documentary sources indicate that these settlements were established during the late 18th century with the principal occupation occurring during the 19th century. The recovered mandrel-pressed beads, European ceramics and English gunflints were useful in confirming the dates of the sites.

There is clearly a need for more research. However, preliminary analysis of the Elmina material illustrates the dating potential of beads. Seriational studies of beads from well-dated contexts at Elmina and elsewhere may be helpful in resolving some of the questions about the life-spans of beads. Killick's (1987) simple presence/absence seriation of beads from five independently-dated southern African sites provided the correct chronological ordering, illustrating the potential importance of this type of analysis. Continued analysis of the Elmina collection, better descriptions of other West African bead collections, and additional documentary research will, it is to be hoped, provide a clearer framework for the dating of beads.

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THE BEADS OF ST. EUSTATIUS, NETHERLANDS ANTILLES

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Archaeological excavations conducted on the Caribbean island of St. Eustatius over a seven-year period produced a wide array of 18th to early 20th-century beads of glass, coral and carnelian. Detailed descriptions of the recovered specimens are supplemented by information concerning their distribution, relative frequencies, color preference, temporal placement, origins, acquisition and use. Comparative site data are also provided.

INTRODUCTION

One of the six Dutch Lesser Antilles, St. Eustatius is located in the northeastern Caribbean about 300 km to the southeast of Puerto Rico (Fig. 1). Statia, as the island is more commonly known, is small in size, only measuring about 8.0 km by 4.5 km (Fig. 2). Its southern end is dominated by "The Quill," a 600-meter-high, extinct volcano, while the northern end is composed of older, eroded volcanic hills. The area in between is a relatively fertile plain but suffers from periods of drought. There are no rivers or streams so that drinking water is obtained by collecting rainwater in cisterns. Approximately 1,700 people currently inhabit Statia, the majority living in Oranjestad, the capital, on the island's west side. The town-proper, called the "Upper Town," is situated atop a cliff about 10 m above the "Lower Town," a narrow tract of land about 2 km long which borders the Caribbean.

HISTORICAL BACKGROUND

Although the French had briefly settled on St. Eustatius in 1629, the first permanent European colony on the island was established in the spring of 1636 by a small group of Zeelanders, Walloons and Flemings. They came under the auspices of the Dutch West India Company which had been founded in 1621 to increase trade with the Caribbean and South America. The colonists built a fort in what is now the Upper Town and named it Fort Oranje.

The colonists immediately set to cultivating tobacco, followed shortly thereafter by sugar cane and cotton. As the century progressed, Statia gradually developed as a center of trade for goods and slaves, reaching its greatest prosperity in the 18th century when it became known as the "Golden Rock." Although Dutch for most of its existence, Statia changed hands 22 times between the Dutch, French and English during the period from 1629 to 1816 (Hartog 1976: 23). The ruins of a string of military installations around the island reflect its turbulent past.

Throughout its development as a major Caribbean center of both legal and illicit trade between the West Indies and North America, Statia's population increased steadily from around 600 in 1705 to a peak of 8,124 (two-thirds slaves) in 1790 (Hartog 1976: 105; Kandle 1985: 78). Jews, both Sephardic and Ashkenasic, from Europe, Curaçao and the Americas, formed a vibrant part of the populace (Emmanuel and Emmanuel 1985).

Although numerous sugar plantations flourished in the country-side, Statia's extraordinary economic development took place in the Lower Town where great quantities of merchandise were sold to a wide array of buyers. Slaves were an especially significant commodity, with Statia becoming the principal slave market in the West Indies during the 18th century (Attema 1976: 21). One of the few descriptions of the Lower Town in its heyday was penned by Janet Schaw (1921: 137-138), a visitor from Scotland, who wandered among its 600 or so warehouses on January 19, 1775:

> The town consists of one street a mile long, but very narrow and most disagreeable, as every

one smokes tobacco, and the whiffs are constantly blown in your face.

But never did I meet with such variety; here was a merch[an]t vending his goods in Dutch, another in French, a third in Spanish, etc. etc. They all wear the habit of their country, and the diversity is really amusing....

From one end of the town of Eustatia to the other is a continued mart, where goods of the most different uses and qualities are displayed before the shop-doors. Here hang rich embroideries, painted silks, flowered Muslins, with all the Manufactures of the Indies. Just by hang Sailor's Jackets, trousers, shoes, hats etc. Next stall contains most exquisite silver plate, the most beautiful indeed I ever saw, and close by these iron-pots, kettles and shovels. Perhaps the next presents you with French and English Millinarywares. But it were endless to enumerate the variety of merchandize in such a place, for in every store you find every thing, be their qualities ever so opposite. I bought a quantity of excellent French gloves for fourteen pence a pair, also English thread-stockings cheaper than I could buy them at home. I was indeed surprised to find that the case with most of the British manufactures....

A good part of Statia's success hinged on its advantageous location in the Caribbean. Surrounded by English, French, Spanish and Danish colonies, each with strong monopolistic trade laws tying it to the mother country, Statian merchants could illegally supply them with a great variety of goods, often at a cheaper rate. During the American Revolution, Statia supplied the American rebels with many of their arms and ammunition (Kandle 1985: 62, 63). During this period, an average of 3,000 ships visited the Golden Rock each year, and even British supplies were available to American merchants.

An event of tremendous significance to Statia's future was Great Britain's declaration of war on Holland in 1780. As an immediate result, Admiral Sir George Brydges Rodney, Commander of the British fleet in the West Indies, seized the island in February of 1781, as it had long disregarded British trade policies. The attack was also provoked by the fact that on November 16, 1776, St. Eustatius became the first country to recognize the American flag by firing a salute to the American ship *Andrea Dorea* as it sailed into the Oranjestad harbor (Tuchman 1988).

Although Rodney confiscated and sold all the goods stored on St. Eustatius and deported many of the Jewish merchants, he did not destroy the "nest of Vipers, which preyed upon the Vitals of Great Britain" as he had originally intended (Attema 1976: 40). Consequently, the island still enjoyed prosperous times in the late 18th century. However, after changing hands a few more times, severe economic decline set in due to changing world markets. The free trade in slaves was outlawed on Statia in 1784, with the result that the trade was practically defunct by the end of the decade (Attema 1976: 30). Visitors to the Lower Town in the early 19th century were met with empty, collapsing warehouses.

Statia returned to Dutch sovereignty for good in 1816. Five years later, the Netherlands forbade the import of African slaves, and slavery was finally abolished in the Dutch West Indies in 1863 (Attema 1976: 30, 47). Due to the lack of trade, the population steadily decreased. Damage caused by severe storms in the late 19th and 20th centuries helped to speed the exodus. So it was that an island once at the hub of the Caribbean's commerce became the "Historical Gem of the Caribbean" where numerous archaeological sites testify to its past power and glory.

ARCHAEOLOGICAL RESEARCH ON STATIA

Since 1981, personnel of the Department of Anthropology, College of William and Mary, Williamsburg, Virginia, have carried out an active program of archaeological research on the historic sites of St. Eustatius, both terrestrial and underwater. Approximately 400 land sites have been recorded, and a select few have been investigated. Glass beads have been found at practically all of these latter sites which are located in three principal areas: the Lower Town, the Upper Town, and the Cultivation Plain. In addition to the beads recovered archaeologically are several in the van der Sleen collection in Amsterdam.

COLOR PLATE CAPTIONS

Pl. IA. *Diakhité:* Beads of stone, shell and metal. **R.1:** rock crystal (quartz). **R.2-3:** carnelian. **R.4:** carnelian and amber. **R.5:** shell. **R.6:** metal (all Diakhité photos by H. Opper).

Pl. IB. *Diakhité*: Glass beads. **R.1-2:** drawn chevron. **R.3-4:** decorated wound. **R.5:** decorated drawn and wound. **R.6:** faceted and striped drawn. **R.7:** multi-faceted drawn and decorated wound. **R.8:** ruby-colored wound. **R.9:** assorted wound and drawn. **R.10:** drawn multi-layered. **R.11:** drawn "seed" beads.

Pl. IC. *Diakhité:* Glass beads and metal ornaments. **R.1-5:** assorted monochrome wound beads. **R.6:** metal ornaments.

Pl. ID. *Fustat (Old Cairo):* Medieval and modern beads donated to the Islamic Museum, Cairo, around 1920 by Fouad, the penultimate monarch of Egypt and father of Farouk. The large bead at the upper left is stone; the other beads at the top are medieval glass. The first strand is of Fustat Fused Rod beads, with green jasper cornerless cubes and a heart pendant in the center. The second strand is composed mostly of Venetian lamp beads, but the mosaic beads are Early Islamic. The third strand is mostly Early Islamic, but the translucent red beads are Venetian (photo by P. Francis).

Pl. IIA. *Fustat (Old Cairo):* Drawn polychrome and mosaic wasters in the Islamic Museum, donated by Dr. Fouqi. Two fused mosaic cane beads are in the center (photo by P. Francis).

Pl. IIB. *Elmina:* Diagnostic glass beads: **R.1-2; R.3, #1,2:** 19th-century wound beads. **R.3, #3-8:** 19th-century mandrel-pressed beads. **R.4, #1,2:** 19th-century moulded beads. **R.4, #3-7:** pre-19th-century bead varieties. **R.5:** imported beads and glass shards modified locally. **R.6, #1-4**: beads manufactured from glass chips. **R.6, #5-7; R.7, #1,2:** powdered-glass beads with glass-chip and trailed-glass decoration. **R.7, #3,4:** 19th-century non-European wound beads. **R.7, #5-8:** 20th-century powdered-glass beads (this and the following photos by R. Chan and K. Karklins).

Pl. IIC. *St. Eustatius:* Drawn beads. **R.1:** 1, Ia2; 2, Ia*(a); 3, Ia19; 4, IIa6. **R.2:** 1-2, IIa7; 3-4, IIa*(a); 5, IIa12; 6, IIa19; 7, IIa27; 8, IIa*(b); 9, IIa*(e); 10, IIa*(d). **R.3:** 1, IIa*(c); 2, IIa41; 3, IIa*(f); 4, IIa55; 5, IIa56; 6, IIb*(a). **R.4:** 1, IIbb*(a); 2, IIIa1; 3, IIIa3; 4, IIIb*(a); 5, IVa5.

Pl. IIIA. *St. Eustatius:* Drawn faceted beads. **R.1:** 1-2, Ic*(a); 3-4, If*(a); 5, If1; 6, If2; 7, If*(c). **R.2:** 1, If*(d); 2, If*(f); 3, If*(g); 4, If*(h). **R.3:** 1, If*(b); 2, If*(e); 3-4, IIIf2; 5-6, IIIf*(c). **R.4:** 1-2, IIIf*(b); 3, IIIf*(d); 4, IIf*(a); 5, IIf*(b).

Pl. IIIB. *St. Eustatius:* Wound glass beads of simple shapes. **R.1:** 1, WIa1; 2, WIb*(a); 3, WIb1; 4, WIb4; 5-6, WIb11. **R.2:** 1-3, WIb16; 4, WIc3. **R.3:** 1, WIc11; 2-3, WIc*(a). **R.4:** 1, WId*(a); 2, WId*(d); 3, WId*(b); 4, WId1; 5, WId*(c); 6-7, WId*(e).

Pl. IIIC. *St. Eustatius:* Wound glass beads with complex shapes, multiple layers or decorated surfaces. **R.1:** 1-2, WIIb*(a); 3, WIIc2; 4, WIIc3; 5, WIIc12. **R.2:** 1-4, WIIf*(d). **R.3:** 1, WIIf*(c); 2, WIIf*(e); 3, WIIq*(a); 4, WII**(a); 5, WIIIa*(a). **R.4:** 1, WIIIa*(b); 2, WIIIb*(b); 3-4, WI-IIb*(a).

Pl. IIID. *St. Eustatius:* Mould-pressed and Prosser-moulded glass beads, and beads of coral and carnelian. **R.1:** 1, MPI**(a); 2, MPIIa*(a); 3, MPIIa*(b); 4, MPIIa*(c). **R.2:** 1, MPII**(a); 2, MPII**(b); 3, MPII**(c). **R.3:** 1, PM**(a); 2-3, coral; 4, carnelian.

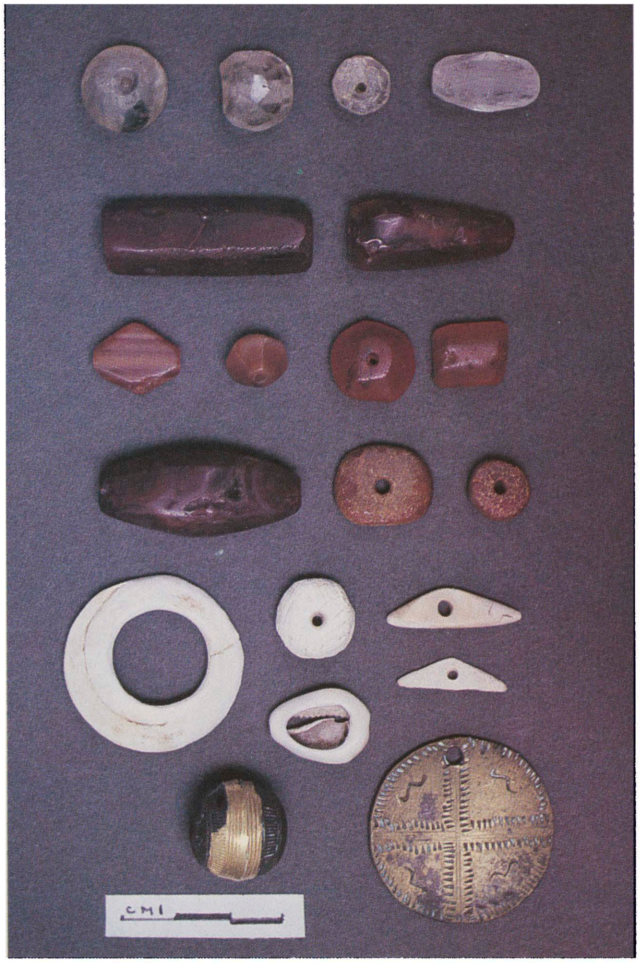

Plate IA. *Diakhité:* Beads of stone, shell and metal.

Plate IB. *Diakhité:* Glass beads.

Plate IC. *Diakhité:* Glass beads and metal ornaments.

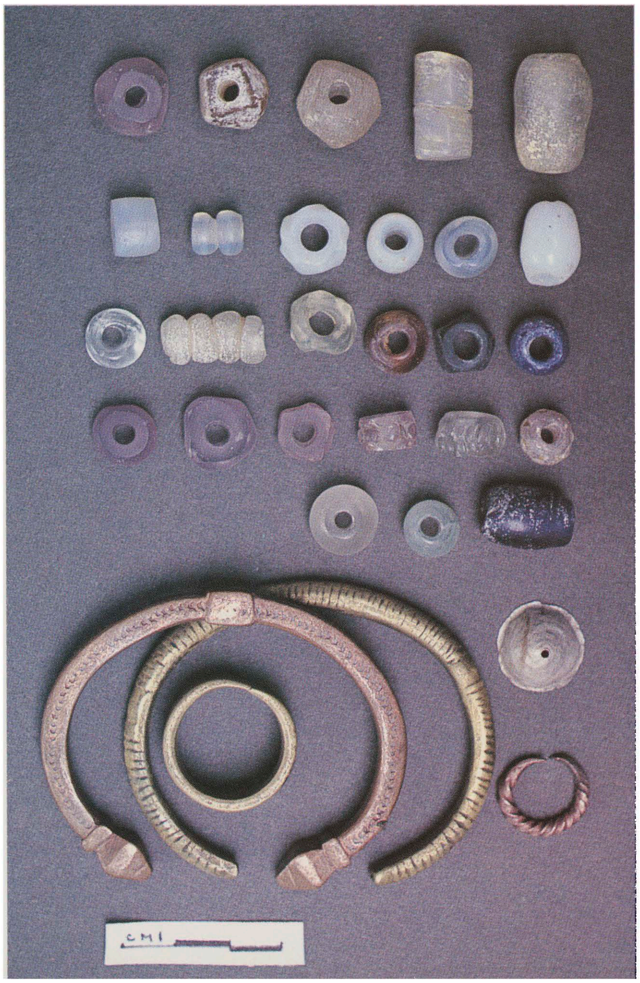

Plate ID. *Fustat (Old Cairo):* Medieval and modern beads.

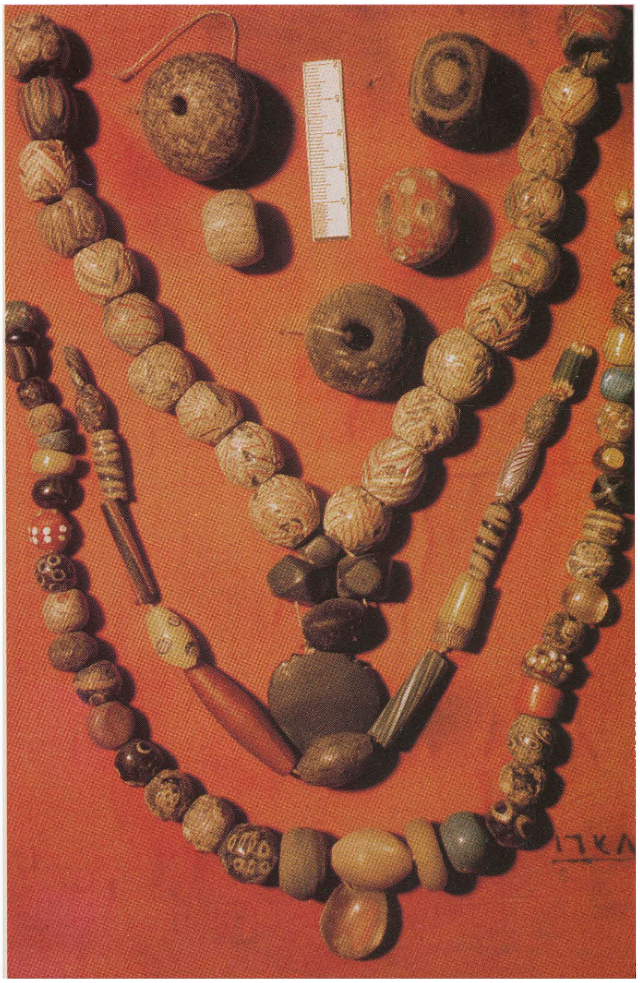

Plate IIA. *Fustat (Old Cairo):* Drawn polychrome and mosaic wasters.

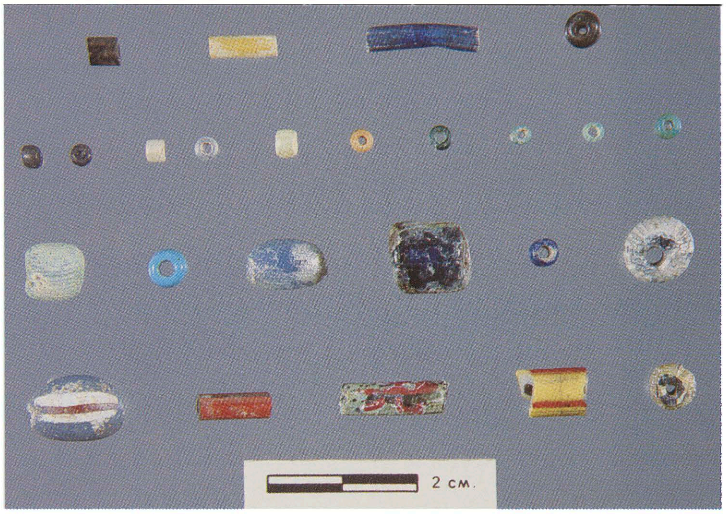

Plate IIC. *St. Eustatius:* Drawn beads.

Plate IIB. *Elmina:* Diagnotic glass beads.

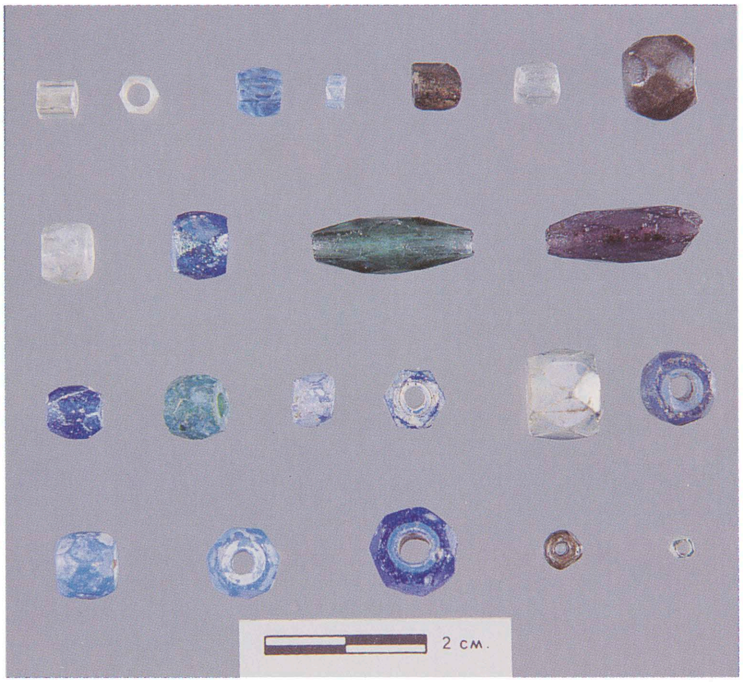

Plate IIIA. *St. Eustatius:* Drawn faceted beads. **R.1:** 1-2, Ic*(a); 3-4, If*(a); 5, If1; 6, If2; 7, If*(c). **R.2:** 1, If*(d); 2, If*(f); 3, If*(g); 4, If*(h). **R.3:** 1, If*(b); 2, If*(e); 3-4, IIIf2; 5-6, IIIf*(c). **R.4:** 1-2, IIIf*(b); 3, IIIf*(d); 4, IIf*(a); 5, IIf*(b).

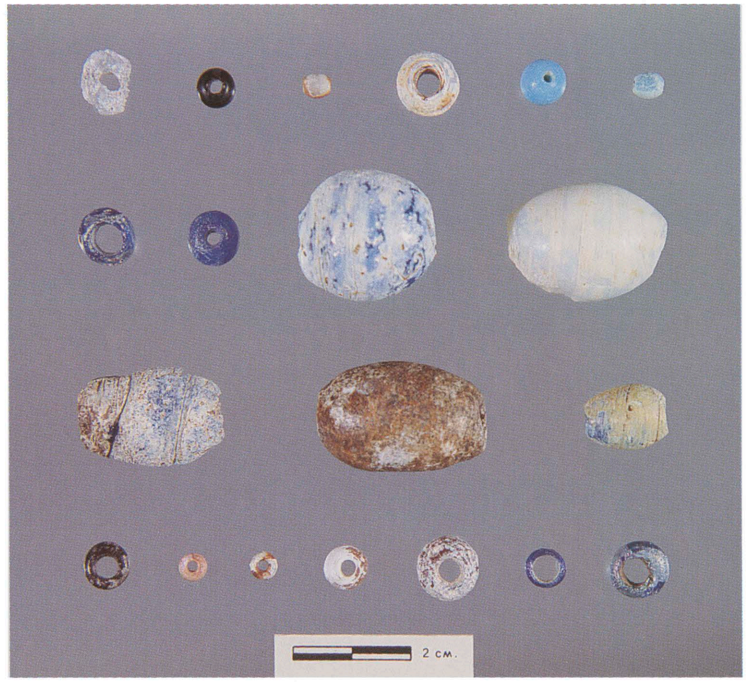

Plate IIIB. *St. Eustatius:* Wound glass beads of simple shapes. **R.1:** 1, WIa1; 2, WIb*(a); 3, WIb1; 4, WIb4; 5-6, WIb11. **R.2:** 1-3, WIb16; 4, WIc3. **R.3:** 1, WIc11; 2-3, WIc*(a). **R.4:** 1, WId*(a); 2, WId*(d); 3, WId*(b); 4, WId1; 5, WId*(c); 6-7, WId*(e).

Plate IIIC. *St. Eustatius:* Wound glass beads with complex shapes, multiple layers or decorated surfaces. **R.1:** 1-2, WIIb*(a); 3, WIIc2; 4, WIIc3; 5, WIIc12. **R.2:** 1-4, WIIf*(d). **R.3:** 1, WIIf*(c); 2, WIIf*(e); 3, WIIq*(a); 4, WII**(a); 5, WIIIa*(a). **R.4:** 1, WIIIa*(b); 2, WIIIb*(b); 3-4, WIIIb*(a).

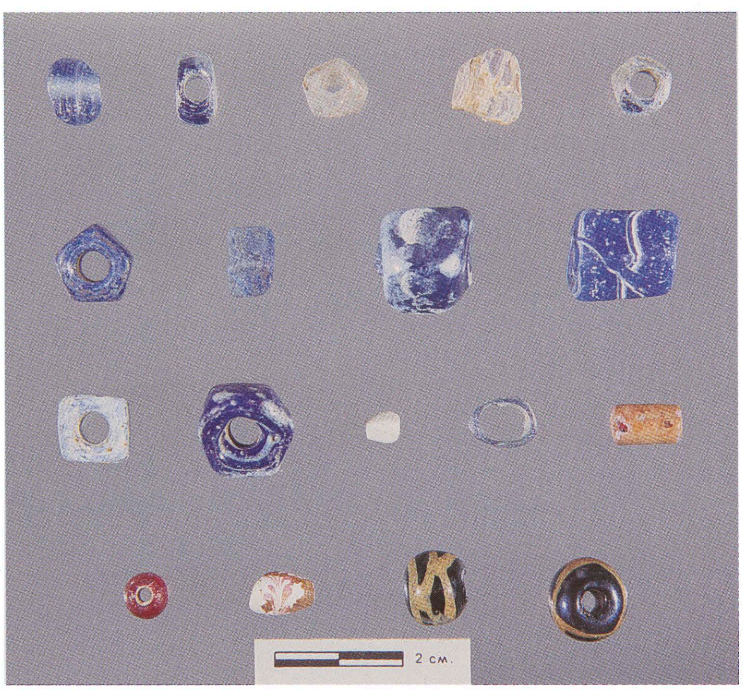

Plate IIID. *St. Eustatius: Mould-pressed and Prosser-moulded glass beads, and beads of coral and carnelian.* **R.1:** 1, MPI**(a); 2, MPIIa*(a); 3, MPIIa*(b); 4, MPIIa*(c). **R.2:** 1, MPII**(a); 2, MPII**(b); 3, MPII**(c). **R.3:** 1, PM**(a); 2-3, coral; 4, carnelian.

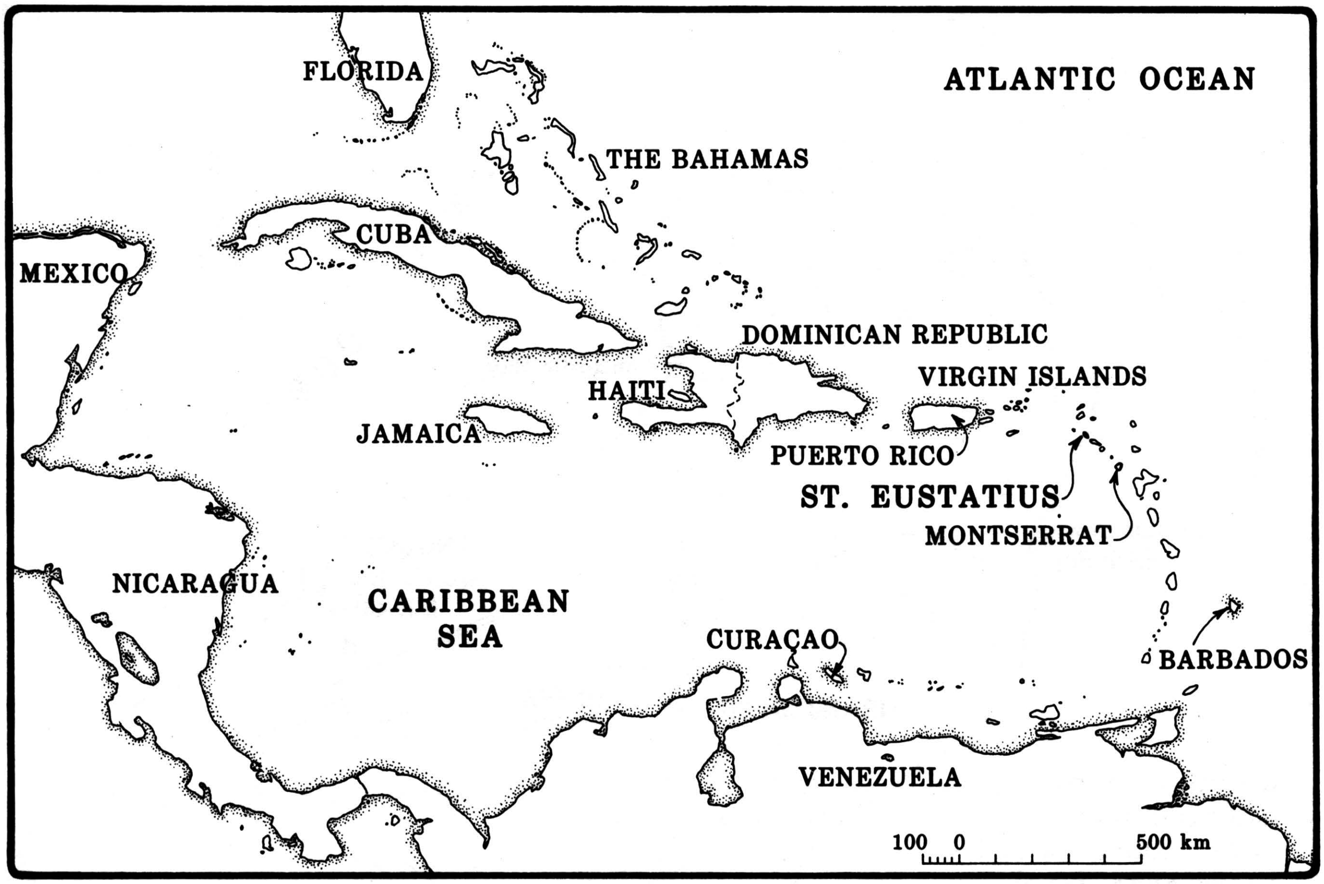

Figure 1. Map of the circum-Caribbean region showing the location of St. Eustatius (drawing by D. Kappler).

The Lower Town

In excess of a hundred visible warehouse ruins, as well as the remains of a probable sugar refinery, have been recorded in the Lower Town area (Barka 1985). Two sites in the warehouse area, and the sugar refinery, popularly known as Crook's Castle, have produced beads.

Crook's Castle (SE 7). This complex site, with some structural walls standing almost intact, is isolated at the extreme southern end of the Lower Town area. The exact nature of the site remains undetermined but a map of about 1780 identifies a turreted structure in this area as a sugar refinery. Such an identification is quite possible given the site's structural characteristics and associated large iron cauldrons.

This site has suffered extensive damage by bead-hunters searching for large blue wound beads locally known as "slave beads" and "Bluebeards" which have been found here in large numbers. Test excavations at the site revealed six bead varieties associated with 18th-19th-century artifacts.

Trash Deposit (SE 19). A significant deposit of early 19th-century artifacts was uncovered between two warehouses in the approximate center of the Lower Town. Up to 1.9 m thick, the deposit produced large quantities of ceramics, glassware, faunal material and other cultural debris, including 28 glass beads. The high quality of the recovered material suggests that it derived from a wealthy household.

Warehouse (SE 307). Located in the northern portion of the Lower Town, this warehouse was tested and found to be underlain by what appears to have been an 18th-century seawall. Only one bead, mixed with 18th-19th century artifacts, was recovered.

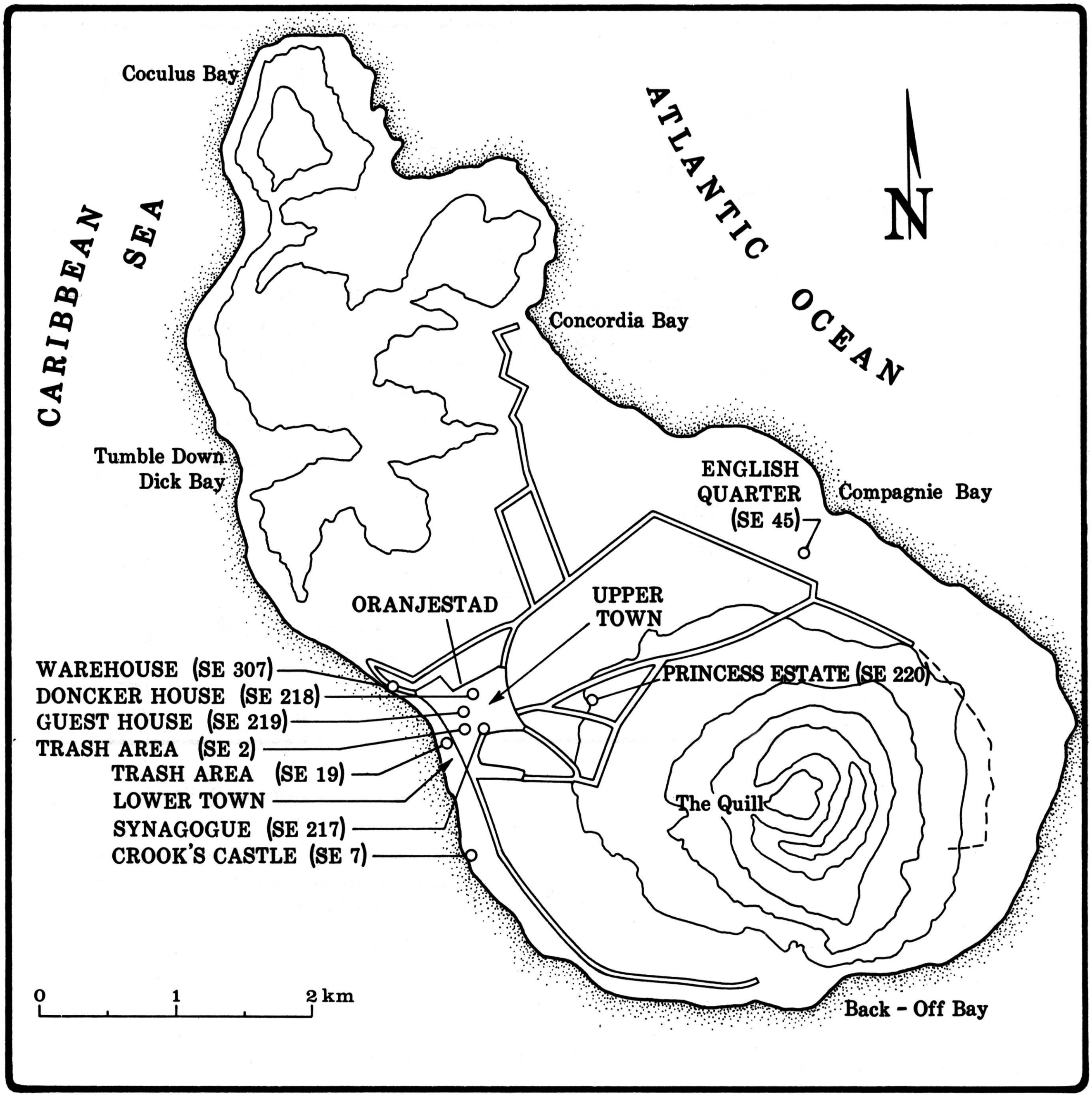

Figure 2. Bead-producing archaeological sites on St. Eustatius (drawing by D. Kappler).

The Upper Town

Several sites have been excavated in the Upper Town to assess life in urban Oranjestad and to obtain a data base for comparison with the Lower Town and sites in the United States and Canada. The following of these have produced beads.

Trash Area (SE 2). An extensive trash deposit was discovered in the area between the ruins of the Dutch Reformed Church and the cliff edge. This is one of the few sites investigated to date that contains undisturbed archaeological material. This dates to the ca. 1750-1775 period.

An unmarked grave, presumably part of a forgotten cemetery, was encountered in the southwestern corner of the site. The individual, apparently an adolescent or juvenile, was oriented in an east-west direction and had beads in association. There was no evidence for a coffin. It may be that this was one of the many victims of the smallpox epidemic of 1776 (Dethlefsen 1982: 78).

Synagogue (SE 217). The *Honen Dalim* synagogue was built in 1739 and used until about 1795. Numerous trash pits, all of which post-date synagogue use, were encountered during excavation (Barka 1988). It appears that the ruins of the brick building were used as a convenient trash disposal area by town dwellers during the early to mid-19th century. One of the pits contained a single bead.

Simon Doncker House (SE 218). Situated on the north side of Oranjestad, the Doncker house was built in the late 17th or early 18th century by a wealthy Dutch merchant. It now serves as a museum. The entire yard was sampled, producing generally mixed 18th-19th-century material, including 46 beads.

Government Guest House (SE 219). This extant 18th-century structure stands in the middle of the old portion of Oranjestad. Three summers have been spent investigating open spaces around the two-storey building whose original purpose remains unknown. Two house foundations, both with 2.6-m-deep cellars, have been uncovered. These have yielded numerous 18th-19th-century artifacts which were in material used to fill the cellars in the first half of the 19th century (Barka 1986). The guest-house excavations produced 171 beads of numerous varieties.

The Cultivation Plain

In addition to an extensive surface survey which yielded data on about 125 sites, several sugar plantations have been more thoroughly researched.

English Quarter Plantation (SE 45). Located on the eastern or Atlantic side of the island, English Quarter was established in the late 18th century but reached its peak of prosperity in the middle of the following century. An extensive complex of ruins, including sugar works and a housing complex, was recorded (France 1984). Limited excavations were carried out in the probable location of the slave quarters. Two beads were found.

Princess Estate (SE 220). The estate covers an area of 16 hectares in the region to the east of Oranjestad. It was surveyed for archaeological sites in 1987. Two 19th-century sugar industrial complexes were excavated, including one mistakenly thought to have been a Jewish *mikve* (Barka 1987). Four beads are in the collection.

Van der Sleen Collection

Held by the Institute for South-Asian Archaeology at the Univerity of Amsterdam, the collection of beads amassed by W.G.N. van der Sleen contains 12 specimens collected from unspecified locations on St. Eustatius. Five of these do not have counterparts in the archaeological collections (Table 1).

THE BEAD INVENTORY

The archaeological excavations and surface collections conducted on St. Eustatius up to the 1988 field season produced 335 glass beads, as well as three of coral and one of stone. Of drawn (131 specimens/43 varieties), wound (195 specimens/31 varieties), mould-pressed (8 specimens/7 varieties), and Prosser-moulded (1 specimen/ 1 variety) manufacture, the glass specimens are described below using an expanded version (Karklins 1985) of Kenneth and Martha Kidd's (1970) classification system. The latter has found broad acceptance in North America as it greatly facilitates the logical ordering of the recorded varieties and the inter-site comparison of bead assemblages. The description of each bead variety is preceded by the appropriate Kidd code. Varieties which do not appear in the Kidds' lists are marked with an asterisk (*) followed by a sequential letter for ease of reference. Two asterisks (**) indicate a previously unrecorded type.

While the shape nomenclature is mostly either self-explanatory or defined in the variety descriptions that follow, two commonly used terms require some clarification. Beads which are *circular* consist of short sections of tubing with slightly to well-rounded ends. The *round* category includes specimens which are globular, as well as oblate and barrel-shaped.

Colors are designated using the names and codes in the *Color Harmony Manual* (Container Corporation of America 1958). The equivalent color code in the Munsell color notation system (Munsell Color 1976) is also provided for the benefit of researchers who may not be familiar with the *Manual*. Beads with patinated surfaces were moistened to bring out their true color.

Diaphaneity is described using the terms opaque (op.), translucent (tsl.) and transparent (tsp.). Opaque beads are impenetrable to light except on the thinnest edges. Specimens that are translucent transmit light yet diffuse it so that objects (such as a pin in the perforation) viewed through them are indistinct. Objects viewed through transparent beads are clearly visible.

The size categories used refer to bead diameter and have the following numerical values: very small, under 2 mm; small, 2-4 mm; medium, 4-6 mm; large, 6-10 mm; and very large, over 10 mm. However, in that this sizing system provides only a minimum of information, the exact diameter and length range of each bead variety is also provided to increase the comparative value of this report.

Drawn Beads

The beads in this category consist of sections of tubing that were drawn out from a hollow globe of moulten glass. Stripes were formed by placing rods or blobs of colored glass on the globe before it was drawn out. The ends of the beads were either left unaltered, or were rounded by subsequent heating and agitation. Their surfaces were also occasionally altered by grinding.

Ia2. Tubular; op. black (p; N 1/0); small size; 1 specimen (Pl. IIC, R.1, #1). Unaltered, broken ends; iridescent patina.

Diameter: 3.8 mm
Length: 4.0 mm

Ia4. Tubular; tsl. oyster white (b; N 8/0); medium size; 2 specimens. Rounded ends; chalky patina.

Diameter: 4.0 - 4.6 mm
Length: 4.5 - 5.6 mm

Ia*(a). Tubular; tsl. sunlight yellow (1-1/2 ga; 5Y 8.5/8); small size; 1 specimen (Pl. IIC, R.1, #2). Slightly rounded ends.

Diameter: 3.1 mm
Length: 9.1 mm

Ia18. Tubular; tsp. ultramarine (13 pa; 6.25PB 3/12); medium size; 1 specimen. Slightly eroded surface.

Diameter: 4.4 mm
Length: 16.3 mm

Ia19. Tubular; tsp. bright navy (13 pg; 7.5PB 2/7); small size; 1 specimen (Pl. IIC, R.1, #3). Rounded ends; the bead is slightly bent from the "tumbling" (heating and agitation) process.

Diameter: 3.3 mm
Length: 15.2 mm

Ic*(a). Tubular, hexagonal; tsp. light gray (c; N 7/0); medium size; 9 specimens (Pl. IIIA, R.1, #1-2). Unaltered to well-rounded ends. Large perforation. Numerous linear bubbles present in most specimens. Light iridescent patina. Some of the specimens may originally have had colored enamel on their perforation surfaces.

Diameter: 3.9 - 4.9 mm
Length: 3.4 - 4.9 mm

If1. Tubular, cornerless-hexagonal; op. black (p; N 1/0); medium size; 1 specimen (Pl. IIIA, R.1, #5). This and the next three varieties consist of six-sided tube segments with an irregular facet ground on each (usually) corner (18 facets total). Uneven, broken ends; iridescent patina.

Diameter: 5.6 mm
Length: 6.1 mm

If2. Tubular, cornerless-hexagonal; tsp. light gray (c; N 7/0); medium to large size; 3 specimens (Pl. IIIA, R.1, #6). Ends composed of relatively flat breaks.

Diameter: 5.1 - 7.7 mm
Length: 4.7 - 6.8 mm

If*(a). Tubular, cornerless-hexagonal; tsp. ultramarine (13 pa; 6.25PB 3/12); medium to large size; 5 specimens (Pl. IIIA, R.1, #3-4). Relatively flat, broken ends.

Diameter: 4.4 - 6.9 mm
Length: 2.5 - 6.4 mm

If*(b). Tubular, cornerless-hexagonal; tsp. bright navy (13 pg; 7.5PB 2/7); medium to large size; 3 specimens (Pl. IIIA, R.3, #1). Unaltered ends.
Diameter: 4.5 - 7.5 mm
Length: 4.8 - 6.6 mm

If*(c). Tubular, cornerless-heptagonal; op. black (p; N 1/10); very large size; 1 specimen (Pl. IIIA, R.1, #7). This and the next three varieties are composed of seven-sided tube sections with a facet ground on each corner (21 facets total). Ends slightly rounded; thick black patina.
Diameter: 10.3 mm
Length: 9.0 mm

If*(d). Tubular, cornerless-heptagonal; tsp. light gray (c; N 7/0); large size; 1 specimen (Pl. IIIA, R.2, #1). The ends are composed of relatively flat breaks.
Diameter: 7.5 mm
Length: 6.0 mm

If*(e). Tubular, cornerless-heptagonal; tsp. turquoise green (20 nc; 5BG 4/8); large size; 1 specimen (Pl. IIIA, R.3, #2). Unaltered ends; light patina.
Diameter: 8.0 mm
Length: 6.8 mm

If*(f). Tubular, cornerless-heptagonal; tsp. bright navy (13 pg; 7.5PB 2/7); large size; 1 specimen (Pl. IIIA, R.2, #2). Flat, unaltered ends; iridescent patina.
Diameter: 8.3 mm
Length: 6.9 mm

If*(g). Elongate, multi-faceted; tsp. surf green (22 ie; 5G 5/4); large size; 1 specimen (Pl. IIIA, R.2, #3). This and the next variety consist of seven-sided tube segments which have 21 diamond-shaped facets around the middle (the central seven facets are original tube faces; the others are cut) and seven elongate-pentagonal cut facets around either end (35 facets total).
Diameter: 6.9 mm
Length: 21.0 mm

If*(h). Elongate, multi-faceted; tsp. rose wine (8 le; 10RP 4/6); large size; 1 specimen (Pl. IIIA, R.2, #4). Dull surface.
Diameter: 6.9 mm
Length: 19.7+ mm

IIa6. Round; op. black (p; N 1/0); medium size; 1 specimen (Pl. IIC, R.1, #4). Patinated.
Diameter: 4.8 mm
Length: 3.8 mm

IIa7. Circular; op. black (p; N 1/0); small size; 4 specimens (Pl. IIC, R.2, #1-2). Patinated.
Diameter: 3.0 - 3.9 mm
Length: 1.7 - 2.4 mm

IIa*(a). Circular; tsp. light gray (c; N 7/0); small size; 4 specimens (Pl. IIC, R.2, #3-4). Pearly patina on most examples.
Diameter: 2.9 - 3.1 mm
Length: 1.5 - 2.5 mm

IIa12. Circular; tsl. oyster white (b; N 8/0); small to large size; 30 specimens (Pl. IIC, R.2, #5). Most beads are cased in a very thin layer of clear glass and exhibit a pearly/iridescent patina.
Diameter: 2.8 - 6.2 mm
Length: 1.7 - 4.6 mm

IIa19. Circular; op. amber (3 lc; 10YR 7/8); small size; 1 specimen (Pl. IIC, R.2, #6). Iridescent patina.
Diameter: 3.0 mm
Length: 2.2 mm

IIa27. Circular; tsp. emerald green (21 nc; 10G 5/10); small size; 4 specimens (Pl. IIC, R.2, #7). Ends range from practically unaltered breaks to well-rounded. Chalky/iridescent patina.
Diameter: 2.2 - 3.4 mm
Length: 1.8 - 2.2 mm

IIa*(b). Circular; op. grass green (23 pe; 10GY 5/10); small size; 1 specimen (Pl. IIC, R.2, #8). Eroded surface.
Diameter: 2.8 mm
Length: 1.9 mm

IIa*(c). Barrel-shaped; tsl. medium turquoise blue (17 le; 2.5B 5/5); large size; 2 specimens (Pl. IIC, R.3, #1). Numerous bubbles in glass; eroded and patinated surfaces. This may actually be variety IIa40.
Diameter: 7.6 - 7.7 mm
Length: 8.0 - 9.3 mm

IIa*(d). Circular; tsl. medium turquoise blue (17 le; 2.5B 5/5); small size; 1 specimen (Pl. IIC, R.2, #10). Slightly patinated.
Diameter: 3.6 mm

Length: 2.0 mm

IIa*(e). Circular; tsl. turquoise (17 pa; 10BG 4/8); small size; 3 specimens (Pl. IIC, R.2, #9). Eroded surfaces.
Diameter: 2.2 - 3.0 mm
Length: 1.1 - 1.9 mm

IIa41. Circular; op. robin's egg blue (16 ic; 5B 6/6); small to medium size; 2 specimens (Pl. IIC, R.3, #2). Shiny surface.
Diameter: 2.3 - 5.0 mm
Length: 1.0 - 3.7 mm

IIa*(f). Oval; op. shadow blue (14 ie; 2.5PB 5/4); large size; 1 specimen (Pl. IIC, R.3, #3). Iridescent patina.
Diameter: 6.9 mm
Length: 11.1 mm

IIa55. Barrel-shaped; tsp. bright navy (13 pg; 7.5PB 2/7); large size; 1 specimen (Pl. IIC, R.3, #4). Heavily patinated.
Diameter: 9.7 mm
Length: 9.9 mm

IIa56. Circular; tsp. bright navy (13 pg; 7.5PB 2/7); small to medium size; 13 specimens (Pl. IIC, R.3, #5). Most examples are patinated.
Diameter: 2.7 - 6.0 mm
Length: 1.1 - 4.7 mm

IIb*(a). Round; tsl. bright navy (13 pg; 7.5PB 2/7) body decorated with 22 thin op. white (a; N 9/0) stripes; large size; 1 specimen (Pl. IIC, R.3, #6). Heavily patinated.
Diameter: 9.1 mm
Length: 7.2 mm

IIbb*(a). Oval; op. shadow blue (14 ie; 2.5PB 5/4) body decorated with 3 op. redwood (6 ne; 10R 4/8) on op. white (a; N 9/0) stripes; large size; 1 specimen (Pl. IIC, R.4, #1). Iridescent patina.
Diameter: 8.5 mm
Length: 12.9 mm

IIf*(a). Circular-faceted; op. black (p; N 1/0) with 3-4 irregular, randomly applied cut facets; small to medium size; 4 specimens (Pl. IIIA, R.4, #4). Patinated.
Diameter: 2.7 - 5.5 mm
Length: 1.5 - 4.0 mm

IIf*(b). Circular-faceted; tsp. ultramarine (13 pa; 6.25PB 3/12) body exhibiting 7 irregular, randomly placed cut facets; small size; 1 specimen (Pl. IIIA, R.4, #5). Eroded and patinated surface.
Diameter: 2.9 mm
Length: 1.9 mm

IIIa1. Tubular; thin op. redwood (6 ne; 10R 4/8) exterior; op. black (p; N 1/0) core; small size; 1 specimen (Pl. IIC, R.4, #2). Core shows through in several places. Uneven, broken ends; thin patina.
Diameter: 3.5 mm
Length: 10.2 mm

IIIa3. Tubular; op. redwood (6 ne; 10R 4/8) exterior; tsp. apple green (23 ic; 10GY 6/6) core; medium size; 1 specimen (Pl. IIC, R.4, #3). End slightly rounded; surface is eroded and patinated.
Diameter: 4.5 mm
Length: 14.7 mm

IIIb*(a). Tubular; op. sunlight yellow (1-1/2 ga; 5Y 8.5/8) exterior decorated with 4 op. redwood (6 ne; 10R 4/8) stripes; tsl. oyster white (b; N 8/0) core; large size; 1 specimen (Pl. IIc, R.4, #4). The stripes are embedded in a thin layer of clear glass, most of which has eroded away.
Diameter: 7.6 mm
Length: 9.0+ mm

IIIf2. Tubular, cornerless-hexagonal; tsp. ultramarine (13 pa; 6.25PB 3/12) exterior; tsl. light aqua blue (16 ea; 5B 8/4) core; medium to large size; 7 specimens (Pl. IIIA, R.3, #3-4). This and the next variety have the same form as their If counterparts. Relatively flat breaks comprise the ends.
Diameter: 4.9 - 7.7 mm
Length: 4.5 - 6.1 mm

IIIf*(a). Tubular, cornerless-hexagonal; tsl. copen blue (13-1/2 ic; 5PB 5/7) exterior which exhibits a distinct golden cast; tsl./op. light aqua blue (16 ea; 5B 8/4) core; medium size; 1 specimen.
Diameter: 4.2 mm
Length: 4.7 mm

IIIf*(b). Tubular, cornerless-heptagonal; op. bright Dutch blue (13 la; 7.5PB 4/11) exterior; op. light aqua blue (16 ea; 5B 8/4) core; large size; 2 specimens (Pl. IIIA, R.4, #1-2). This and the next two varieties have forms identical to their If counterparts. Flat, broken ends; thin white patina.

Diameter: 8.4 - 8.9 mm
Length: 7.0 mm

IIIf*(c). Tubular, cornerless-heptagonal; tsp. bright navy (13 pg; 7.5PB 2/7) exterior; tsl. light aqua blue (16 ea; 5B 8/4) core; large to very large size; 7 specimens (Pl. IIIA, R.3, #5-6). Relatively flat, broken ends; slightly to heavily patinated.

Diameter: 7.7 - 11.0 mm
Length: 6.5 - 9.2 mm

IIIf*(d). Tubular, cornerless-heptagonal; tsp. bright navy (13 pg; 7.5PB 2/7) exterior; tsl. light aqua blue (16 ea; 5B 8/4) middle layer; tsp. bright navy core; very large size; 1 specimen (Pl. IIIA, R.4, #3). Broken but relatively flat ends.

Diameter: 10.7 mm
Length: 8.5 mm

IVa5. Round; op. redwood (6 ne; 10R 4/8) exterior; tsp. apple green (23 ic; 10GY 6/6) core; medium to large size; 2 specimens (Pl. IIC, R.4, #5). Eroded and patinated surface.

Diameter: 4.9 - 7.0 mm
Length: 4.6 - 6.6 mm

Wound Beads

These were created by winding a strand of moulten glass around a metal mandrel until the desired size and shape were achieved. While the glass was still viscid, moulten filaments of contrastingly colored glass could be trailed over the surface to add decorative elements, or the glass could be pressed with small paddles to impart "soft" facets or be otherwise manipulated to produce complex shapes.

WIa1. Cylindrical; tsp. light gray (c; N 7/0); very large size; 1 fragmentary specimen (Pl. IIIB, R.1, #1). Eroded surface.

Diameter: 10.1 mm
Length: 5.9+ mm

WIb*(a). Round; op. black (p; N 1/0); medium to very large size; 5 specimens (Pl. IIIB, R.1, #2). Shiny to dull surfaces.

Diameter: 4.0 - 11.1 mm
Length: 3.3 - 10.0 mm

WIb1. Round; tsl. light gray (c; N 7/0); medium size; 1 specimen (Pl. IIIB, R.1, #3). Heavily patinated.

Diameter: 4.2 mm
Length: 4.9 mm

WIb4. Round; tsp. pale blue (15 ca; 7.5B 8/2) exhibiting an opalescent cast; very large size; 5 specimens (Pl. IIIB, R.1, #4). Chalky patina.

Diameter: 10.5 - 20.0+ mm
Length: 8.0 - 20.0+ mm

WIb11. Round; op. robin's egg blue (16 ic; 5B 6/6); medium to large size; 6 specimens (Pl. IIIB, R.1, #5-6). Slightly patinated.

Diameter: 4.7 - 7.8 mm
Length: 4.3 - 7.3 mm

WIb*(b). Round; op. aqua blue (18 gc; 2.5B 6/4); medium size; 1 specimen. Eroded surface.

Diameter: 5.9 mm
Length: 6.6 mm

WIb16. Round; tsp./tsl./op. bright navy (13 pg; 7.5PB 2/7); large to very large size; 20 specimens (Pl. IIIB, R.2, #1-3). Some examples, especially the larger ones, are practically opaque. Distinct wind marks and a light to heavy patina are visible on most specimens.

Diameter: 8.0 - 22.6 mm
Length: 5.1 - 23.1 mm

WIc3. Oval; tsl. pale blue (15 ca; 7.5B 8/2); very large size; 3 specimens (Pl. IIIB, R.2, #4). Chalky patina.

Diameter: 18.7 - 19.9 mm
Length: 22.6 - 27.2 mm

WIc11. Oval; tsp./tsl. ultramarine (13 pa; 6.25PB 3/12); large to very large size; 3 specimens (Pl. IIIB, R.3, #1). Patinated and eroded.

Diameter: 9.2 - 17.0 mm
Length: 11.2 - 24.5 mm

WIc*(a). Oval; tsp./tsl. bright navy (13 pa; 7.5PB 2/7); very large size; 6 specimens (Pl. IIIB, R.3, #2-3). Most specimens are patinated, some to the point of near devitrification.

Diameter: 10.0 - 18.1 mm
Length: 13.6 - 27.9 mm

WId*(a). Doughnut-shaped; op. black (p; N 1/0); large size; 1 specimen (Pl. IIIB, R.4, #1). This and the next five varieties have oblate bodies with comparatively large perforations. Slightly patinated.

Diameter: 8.0 mm
Length: 3.2 mm

WId*(b). Doughnut-shaped; tsp. light gray (c; N 7/0); medium size; 1 specimen (Pl. IIIB, R.4, #3). Heavily patinated.

Diameter: 4.7 mm
Length: 2.2 mm

WId1. Doughnut-shaped; tsp. amber (3 lc; 10YR 7/8); large size; 1 specimen (Pl. IIIB, R.4, #4). Thick white patina.

Diameter: 7.4 mm
Length: 4.8 mm

WId*(c). Doughnut-shaped; tsp. reddish amber (5 pe; 2.5YR 4/10); very large size; 1 specimen (Pl. IIIB, R.4, #5). Chalky patina.

Diameter: 10.9 mm
Length: 4.7 mm

WId*(d). Doughnut-shaped; tsp. ruby (8 pc; 2.5R 3/10); medium size; 1 specimen (Pl. IIIB, R.4, #2). Thick chalky patina.

Diameter: 4.8 mm
Length: 2.3 mm

WId*(e). Doughnut-shaped; tsp. bright navy (13 pg; 7.5PB 2/7); large to very large size; 3 specimens (Pl. IIIB, R.4, #6-7). Patinated.

Diameter: 7.0 - 10.1 mm
Length: 3.4 - 5.3 mm

WIIb*(a). Flattened-round; tsp. bright navy (13 pg; 7.5PB 2/7); large to very large size; 17 specimens (Pl. IIIC, R.1, #1-2). These are round beads that were pressed flat parallel to the perforation while the glass was still soft. Most specimens exhibit a chalky to iridescent patina.

Width: 9.7 - 14.9 mm
Length: 7.2 - 13.1 mm
Thickness: 5.4 - 8.3 mm

WIIc2. Pentagonal-faceted; tsp. light gray (c; N 7/0); very large size; 2 specimens (Pl. IIIC, R.1, #3). This and the next two varieties have semi-globular bodies that exhibit eight pressed pentagonal facets; the ends are square. Eroded surfaces.

Diameter: 10.3 - 10.4 mm
Length: 8.1 - 8.7 mm

WIIc3. Pentagonal-faceted; tsp. pale blue (15 ca; 7.5B 8/2) with an opalescent cast; very large size; 1 specimen (Pl. IIIC, R.1, #4). Chalky patina.

Diameter: 11.6 mm
Length: 10.6 mm

WIIc12. Pentagonal-faceted; tsp. bright navy (13 pg; 7.5PB 2/7); large size; 1 specimen (Pl. IIIC, R.1, #5). Iridescent patina.

Diameter: 9.2 mm
Length: 7.5 mm

WIIf*(a). Ridged tube (pentagonal cross-section); tsl. pale blue (15 ca; 7.5B 8/2) with a distinct golden cast; very large size; 1 specimen. This and the following five varieties exhibit quadrilateral pressed facets that extend the entire length of each bead.

Diameter: 10.7 mm
Length: 12.2 mm

WIIf*(b). Ridged tube (pentagonal cross-section); tsp. ultramarine (13 pa; 6.25PB 3/12); very large size; 1 specimen. Eroded surface.

Diameter: 10.4 mm
Length: 12.4 mm

WIIf*(c). Ridged tube (square cross-section); tsp./tsl. bright navy (13 pg; 7.5PB 2/7); very large size; 1 specimen (Pl. IIIC, R.3, #1). White patina.

Diameter: 10.7 mm
Length: 10.6 mm

WIIf*(d). Ridged tube (pentagonal cross-section); tsp./tsl./op. bright navy (13 pg; 7.5PB 2/7); large to very large size; 85 specimens (Pl. IIIC, R.2, #1-4). These come in a short (#2), standard (#3) and long (#4) form (Beck 1928: Pl. 2 and 3). The glass was usually much eroded and heavily patinated. One specimen was practically devitrified.

Diameter: 9.9 - 16.9 mm
Length: 6.3 - 19.8 mm

WIIf*(e). Ridged tube (hexagonal cross-section); tsl./op. bright navy (13 pg; 7.5PB 2/7); very large size; 1 specimen (Pl. IIIC, R.3, #2). Slightly eroded surface exhibiting spots of white patina.

Diameter: 14.3 mm
Length: 16.5 mm

WIIq*(a). Standard square bicone (Beck [1928] type IX.C.2.e.); op. white (a; N 9/0); medium size; 1 specimen (Pl. IIIC, R.3, #3). The bead has a square cross-section and tapers toward either end.

Diameter: 5.0 mm
Length: 5.5 mm

WII(a).** Faceted ring; tsp. bright navy (13 pg; 7.5PB 2/7); very large size; 1 specimen (Pl. IIIC, R.3, #4). This bead consists of a thin glass ring with an alternating series of pressed triangular facets on its surface. The perforation is quite large. The surface is eroded and patinated.

Diameter: 10.5 mm
Length: 4.3 mm

WIIIa*(a). Cylindrical; tsp. ruby (8 pc; 2.5R 3/10) exterior; op. white (a; N 9/0) core; large size; 1 specimen (Pl. IIIC, R.3, #5). Thick pinkish-brown patina.

Diameter: 6.3 mm
Length: 10.5 mm

WIIIa*(b). Round; tsp. ruby (8 pc; 2.5R 3/10) exterior; op. white (a; N 9/0) core; large size; 18 specimens (Pl. IIIC, R.4, #1). A thick light brown patina covers most specimens.

Diameter: 6.3 - 8.5 mm
Length: 5.5 - 8.5 mm

WIIIb*(a). Round; op. black (p; N 1/0) body decorated with a lattice-work composed of three meandering and intersecting op. white (a; N 9/0) or light gold (2 ic; 2.5Y 7/8) stripes; very large size; 2 specimens (Pl. IIIC, R.4, #3-4). Shiny surfaces.

Diameter: 11.5 - 12.6 mm
Length: 8.2 - 10.1 mm

WIIIb*(b). Oval (olive-pit-shaped); op. white (a; N 9/0) body decorated with a tsp. scarlet (7 pa; 7.5R 4/14) wreath or floral spray about the middle; large size; 3 specimens (Pl. IIIC, R.4, #2). Earthy dark brown patina.

Diameter: 6.0 - 6.5 mm
Length: 9.8 - 10.2+ mm

Mould-Pressed Beads

Two basic methods were used to manufacture mould-pressed beads. In the first, a glob of viscid glass was pressed in a two-piece mould which had a moveable pin that formed the perforation. In the second method, two pieces of moulten glass, one in either half of a two-piece mould, were pressed together to fuse them. Again, a moveable pin created the perforation. In a variation (termed "mandrel-pressed") of the second method, a conical pin protruding from the center of one of the mould halves produced the perforation. As the pin did not extend all the way to the other side of the closed mould, the glass filling the narrow end of the tapered perforation had to be punched through leaving a concave scar in this area.

MPI(a).** Oblong "toggle" bead; op. scarlet (7 pa; 7.5R 4/14); small size; 1 specimen (Pl. IIID, R.1, #1). A mould mark encircles the long axis of the bead. The parallel-sided perforation is small, and passes throught the center of the bead perpendicular to the axis of the mould mark. Shiny surface.

Width: 8.7 mm
Length: 3.9 mm
Thickness: 3.7 mm

MPIIa*(a). Round-faceted ("mandrel-pressed"); op. black (p; N 1/0); medium size; 1 specimen (Pl. IIID, R.1, #2). The surface exhibits approximately seven irregular facets; the original curved bead surface is visible in several places. The ends are unaltered. A distinct mould mark encircles the equator. The perforation tapers noticeably. Shiny surface.

Diameter: 5.7 mm
Length: 5.0 mm

MPIIa*(b). Round-faceted ("mandrel pressed"); tsp. bright navy (13 pg; 7.5PB 2/7); large size; 2 specimens (Pl. IIID, R.1, #3). Approximately 26 irregular cut facets cover the surface. The ends are ground flat. A mould seam encircles the middle. The perforation has a distinct taper. An iridescent patina covers the surface.

Diameter: 6.5+ - 8.4 mm
Length: 7.0 mm

MPIIa*(c). Round-faceted ("mandrel-pressed"); tsp. rose wine (8 le; 10RP 4/6); medium size; 1 specimen (Pl. IIID, R.1, #4). The surface exhibits around seven irregular cut facets, as well as several sections of the original curved bead surface. The ends are unaltered. A distinct mould seam encircles the equator. The perforation tapers noticeably. Patinated.

Diameter: 5.0 mm
Length: 4.4 mm

MPII(a).** Oblong-faceted ("mandrel-pressed"); tsp. ruby (8 pc; 2.5R 3/10); small size; 1 specimen (Pl. IIID, R.2, #1). Twenty irregular quadrilateral cut facets cover the shiny surface, ten on either side of the middle. The shape most closely approximates Beck's (1928) "long truncated convex polygonal bicone" (XV.D.1.f.). No mould seam is visible. The perforation tapers slightly.

Diameter: 3.3 mm
Length: 5.0 mm

MPII(b).** Oval-faceted; tsp. light gray (c; N 7/0); large size; 1 specimen (Pl. IIID, R.2, #2). The surface is covered with 24 cut facets: 6 pentagonal around either end and 12 interconnected diamond-shaped ones around the middle. The ends exhibit unaltered curved surfaces. The perforation is small and parallel-sided. Light whitish patina.

Diameter: 7.4 mm
Length: 10.7 mm

MPII(c).** Oval-faceted; tsp./tsl. ruby (8 pc; 2.5R 3/10); large size; 1 specimen (Pl. IIID, R.2, #3). There are 28 cut facets: 6 elongate pentagonal about either end and 16 diamond-shaped around the middle. The slightly tapered perforation is very small. Slight iridescent patina.

Diameter: 6.2 mm
Length: 9.2 mm

Prosser-Moulded Beads

These were made by pressing a finely-powered mixture of clay, feldspar and flint into moulds to achieve the desired form and then baking them in an oven until the material fused. A colored glaze could then be applied, if desired.

PM(a).** Cylindrical; tsl./op. emerald green (21 nc; 10G 5/10); medium size; 1 specimen (Pl. IIID, R.3, #1). One end of the bead is rounded and smooth; the other is rough.

Diameter: 4.1 mm
Length: 4.4 mm

Coral Beads

Barrel-shaped; op. coral (6 lc; 10R 5/10); small to medium size; 3 specimens (Pl. IIID, R.3, #2-3). The specimens have smooth surfaces, flat to concave and irregular ends, and parallel-sided perforations.

Diameter: 3.6 - 5.5 mm
Length: 3.2 - 4.5 mm

Carnelian Bead

Round; tsp./tsl. banded reddish orange (6 lc; 10R 5/10); large size; 1 specimen (Pl. IIID, R.3, #4). Drilled from either end, the perforation consists of two misaligned segments that barely touch in the middle. Shiny, polished surface.

Diameter: 7.5 mm
Length: 6.8 mm

BEAD DISTRIBUTION

During the 1981-87 field seasons, the archaeologists from William and Mary recovered 325 beads of glass, coral and stone. Of these, over half (53%) came from the Government Guest House area (SE 219). The Doncker House yard (SE 218) and Dutch Reformed Church trash area (SE 2) each yielded 14% of the total, while Crook's Castle (SE 7) and the Lower Town trash deposit (SE 19) shared another 16% about equally. The English Quarter complex (SE 45), synagogue (SE 217), Princess Estate (SE 220) and Lower Town warehouse (SE 307) were practically bereft of beads, sharing the remaining 3% of the bead collection.

The relatively large number of beads in the guesthouse excavations looks significant but is simply due to the fact that, of all the sites, this one has been the most extensively excavated. The low percentage of beads at the English Quarter slave quarters is probably a reflection of the limited amount of work that has been conducted there. What is significant about the distribution of the beads is the fact that many of them were found in domestic contexts indicating that they were used by the local population rather than just stored on Statia for re-export to other markets (Table 1).

RELATIVE BEAD FREQUENCIES

Although 84 different bead varieties are represented in the archaeological and van der Sleen collections, just six of them account for over half the collection (Table 2). While three of the varieties (IIa12, IIa56, WIb16) are very common and widely distributed in the Western Hemisphere, the remaining three, especially the WIIf*(d) variety, are not, suggesting that the latter were either especially popular with the local population or that Statia was a major distribution point for them.

Faceted beads formed a substantial part of the bead collection, comprising 50% of it. Although 35 varieties representing three manufacturing types were enumerated, over half the faceted specimens were of one variety: WIIf*(d), the bright navy, pentagonal ridged tube. Cornerless-hexagonal and heptagonal beads (If and IIIf), represented by 15 varieties, were also relatively common, forming 21% of the faceted bead group. Of the non-faceted beads, two types predominated: IIa, monochrome drawn circular (14 varieties; 68 specimens/20%), and WIb, wound round (6 varieties; 38 specimens/11%).

COLOR PREFERENCE

Blue beads predominated (62%) on St. Eustatius with white/gray beads a distant second (17%). Red/pink beads (9%) and black ones (6%) were much less common, while green (2%), yellow/amber (2%), purple (1%) and decorated (2%) beads were found in only minor quantities. A decided preference for blue beads was also noted at the other Caribbean sites surveyed in Table 3. No other pattern could be discerned except that green, purple and decorated beads were always in a decided minority. Blue beads are seemingly near-universal in popularity in the Western Hemisphere, being frequently encountered on both plantation and Indian sites in the United States, as well as on sundry sites in Europe and Africa. The scarcity of decorated beads on the Caribbean islands is interesting as at Elimina, Ghana, and Bunce Island, Sierra Leone, they are quite common. Whether this scarcity reflects a general disdain for decorated beads in the Caribbean, their unavailability in the local markets, or some other factor (price?) will have to be resolved by further research.

COMPARATIVE SITE DATA

Comparing the 84 Statian bead varieties to those recovered from 15 sites in the Caribbean, North and South America, West Africa and Europe (Table 3), the highest number of correlatives is with the Amsterdam sites (36 correlatives or 43%), the logical point of origin for much of the material shipped to St. Eustatius, especially during the periods of Dutch rule. Next, with 32 correlatives, is Elmina, a major Dutch trading fort on the West African Gold Coast from 1637 to 1872. These sites are followed by four Indian sites or site-groups and two trading posts in the United States. The presence of a high rate of correlatives on four of these sites (Trudeau, Guebert, Rock Island and Fort Michilimackinac) is probably due to the fact that these primarily 18th-century sites were all supplied by the French who are known to have obtained at least some of their beads from Holland during the 18th century (Brain 1979: 299). Comparable correlatives at the contemporary Susquehannock sites, primarily supplied by the British and Americans, reveal that the latter also had ready access to the same beads as the Dutch and French. The sixth site, Fort Vancouver, also English/American, is the latest one in the group and its high rate of correlatives shows that the beads shipped to Statia in the 19th century were much the same as those that found their way to other parts of the world.

Interestingly, there are comparatively few correlatives with the three Caribbean sites. It may be noteworthy that all three were English colonies, which also holds true for low-correlative Bunce Island in West Africa. However, whether the low correlative rate is due to different suppliers or simply reflects different local tastes or the unavailability of specific varieties on these islands can only be speculated on at this time. These factors may also explain the few correlatives at the First Hermitage and St. Augustine. The apparent scarcity of correlatives at the Vila Velha cemetery is misleading. The site only produced eight bead varieties, so with seven matches, the relative number of correlatives is actually very high.

CHRONOLOGICAL DATA

While most of the recovered beads were found in mixed 18th-19th-century contexts, it is possible to assign the majority of the more distinctive types and varieties to one of three general time periods (Table 4). Based on comparisons with beads from well-dated

Table 1. Distribution of the St. Eustatius Bead Varieties.

	SE 2	SE 7	SE 19	SE45	SE 217	SE 218	SE 219	SE 220	SE 307	Sleen	Total
Ia2						1					1
Ia5		2									2
Ia*(a)						1					1
Ia18										1	1
Ia19						1					1
Ic*(a)						8	1				9
If1						1					1
If2						1	2				3
If*(a)							5				5
If*(b)							1	1		1	3
If*(c)						1					1
If*(d)							1				1
If*(e)							1				1
If*(f)							1				1
If*(g)						1					1
If*(h)							1				1
IIa6						1					1
IIa7	4										4
IIa*(a)						1	3				4
IIa12	13	5	1			3	8				30
IIa19	1										1
IIa27							4				4
IIa*(b)							1				1
IIa*(c)	1						1				2
IIa*(d)							1				1
IIa*(e)							3				3
IIa41							2				2
IIa*(f)						1					1
IIa55							1				1
IIa56	10					1	2				13
IIb*(a)	1										1
IIbb*(a)				1							1
IIf*(a)						3	1				4
IIf*(b)						1					1
IIIa1						1					1
IIIa3	1										1
IIIb*(a)	1										1
IIIf2							7				7
IIIf*(a)										1	1
IIIf*(b)							2				2
IIIf*(c)						2	5				7
IIIf*(d)						1					1
Sub-total	32	7	1	1	0	30	54	1	0	3	129

Table 1. Continued.

	SE 2	SE 7	SE 19	SE45	SE 217	SE 218	SE 219	SE 220	SE 307	Sleen	Total
IVa5	2										2
WIa1			1								1
WIb*(a)	1					1	1	2			5
WIb1							1				1
WIb4						1	4				5
WIb11						2	4				6
WIb*(b)										1	1
WIb16	2	1	3				12			2	20
WIc3	1		1				1				3
WIc11	1					1				1	3
WIc*(a)			1			1	4				6
WId*(a)							1				1
WId*(b)							1				1
WId1							1				1
WId*(c)							1				1
WId*(d)							1				1
WId*(e)		1		1		1					3
WIIb*(a)		6	2			1	7			1	17
WIIc2							2				2
WIIc3			1								1
WIIc12						1					1
WIIf*(a)										1	1
WIIf*(b)										1	1
WIIf*(c)							1				1
WIIf*(d)	3	12	18			3	43	1	1	4	85
WIIf*(e)							1				1
WIIq*(a)							1				1
WII**(a)							1				1
WIIIa*(a)							1				1
WIIIa*(b)						2	16				18
WIIIb*(a)	2										2
WIIIb*(b)	1						2				3
MPI**(a)							1				1
MPIIa*(a)						1					1
MPIIa*(b)					1		1				2
MPIIa*(c)							1				1
MPII**(a)							1				1
MPII**(b)							1				1
MPII**(c)							1				1
PM**(a)							1				1
Coral						1	2				3
Carnelian							1				1
Sub-total	13	20	27	1	1	16	117	3	1	11	210
Total	45	27	28	2	1	46	171	4	1	14	339

Table 2. The Six Most Common Bead Varieties from St. Eustatius.

Variety	Description	Quantity	Percent
WIIf*(d)	Ridged tube (pentagonal), tsp. op. bright navy	85	25
IIa12	Circular, tsl. oyster white	30	9
WIb16	Round, tsp. op. bright navy	20	6
WIIIa*(b)	Round, tsp. ruby on op. white	18	5
WIIb*(a)	Flattened-round, tsp. bright navy	17	5
IIa56	Circular, tsp. bright navy	13	4
	Total	183	54

sites and bead sample cards and books in North America, Europe and West Africa, Period I dates from around 1700 to 1800, Period II extends from about 1800 to 1880, while Period III covers the years from ca. 1880 to 1935 or so. Periods I and II generally correspond to Quimby's (1966) Middle and Late Historic periods, respectively, but with expanded date ranges that reflect more recent chronological information. It is noteworthy that no significant temporal differences were noted between the bead varieties and types found on sites in the Caribbean and those in Holland, coastal West Africa, and the eastern United States. Consequently, those studying beads from Circum-Caribbean sites can avail themselves (with obvious caution!) of the wealth of comparative data from North American sites that appears in the two bibliographies prepared by Karklins and Sprague (1980, 1987).

A good number of the beads listed in Table 4 have long temporal ranges (WIbl6 and WIdl are good examples) or fall on the dividing line between periods as does variety WIIIb*(b). Each bead type or variety was, therefore, assigned to a specific period on the basis of its modal and core dates. Thus, it is possible that not every WIbl6 or WIdl bead was deposited during the 18th century, but the likelihood is that most of them were.

ORIGINS

The majority of the Period I beads have counterparts at various 18th-century archaeological sites in Amsterdam and it is almost certain that the bulk of them were shipped to Statia from this important Dutch seaport. It has long been accepted that the very large, wound, monochromatic varieties were manufactured in Holland (Sleen 1967: 108-109), but there is no historical or archaeological proof for this. Numerous wound beads have been found in and around Amsterdam, but never in association with identifiable manufacturing wasters such as glass rods and malformed beads, or discarded mandrels or moulds. Thus, there is the possibility that the wound beads were not made in Amsterdam but merely stored there for shipment abroad. A lack of contemporary comparative data from other bead-producing centers in Europe does little to alleviate the situation. It is hoped that future research will resolve this problem once and for all.

While the bulk of the Period I beads were almost certainly supplied and perhaps even made by the Dutch, the presence of these beads at an archaeological site does not automatically indicate either Dutch contact or presence as many of these same beads have been found on sites occupied or supplied by the French, English, Spanish and Portuguese (*see* Table 3), as well as the Danes (Hansen 1979). It is known that Holland supplied the French and English with beads during the 18th century (Karklins 1983: 113), and it would be no surprise to learn that Spain, Portugal and Denmark were also on the list. So, while an 18th-century "Dutch bead assemblage" can be identified on Statia (all the Period I beads excluding WIIb*[b] and the three drawn varieties), it is one that can also be expected in those parts of the world where

Key to Table 3 (Site name and location; site function; probable principal ethnic affiliation; date range; references cited):

1) **Newton Cemetery, Barbados.**
Slave cemetery; English; ca. 1660-ca. 1775 (Handler and Lange 1978).

2) **New Montpelier Estate, Jamaica.**
Worker's village; English; 1770-1910, mostly 19th century (Karklins 1988).

3) **Galways Plantation, Montserrat.**
Slave village; English; ca. 1790-ca. 1850 (Karklins: personal observation).

4) **Vila Velha Cemetery, Amapá, Brazil.**
Indian cemetery; Portuguese/Dutch(?); prob. late 17th-18th century (Meggers and Evans 1957).

5) **St. Augustine, Florida.**
Spanish town site; Spanish/English; 1700-1821 (Deagan 1974; 1987; Martinez and Ruple 1972; Young 1975).

6) **Trudeau Site, Louisiana.**
Tunica Indian village; French; 1731-1764 (Brain 1979).

7) **First Hermitage, Tennessee.**
Slave plantation; American; 1804-1856 (Good 1976).

8) **Susquehannock Sites, Pennsylvania.**
Indian villages/cemeteries; English; 1575-1760s (Kent 1984).

9) **Fort Michilimackinac, Michigan.**
Military establishment/major trading post; French/English; 1715-1781 (Stone 1974).

10) **Guebert Site, Illinois.**
Kaskaskia Indian village; French/American; 1719-1833 (Good 1972).

11) **Rock Island, Wisconsin.**
Indian villages; French; ca. 1640-1770 (Mason 1986).

12) **Fort Vancouver, Washington.**
Major Hudson's Bay Company post; English/American; 1829-1860 (Ross 1976).

13) **Bunce Island, Sierra Leone.**
Trading fort/slaving station; English; 1672-1807 (Karklins 1989).

14) **Elmina, Ghana.**
African settlement; Portuguese/Dutch/English; 1482-1873/Dutch: 1637-1872 (Karklins: personal observation).

15) **Amsterdam Sites, The Netherlands.**
Major European commercial center; Dutch; 1650-1800 (Karklins: personal observation).

Table 3. The St. Eustatius Beads: Comparative Sites.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ia2								x	x	x	x	x	x	x	x
Ia4	x					x		x	x	x	x	x		x	x
Ia*(a)						x			x			?	x	x	
Ia18					?				x		x				
Ia19						x		x	x	x	x		x	x	x
Ic*(a)															
If1							x			x		x		x	
If2							x			x		x			
If*(a)		x								?					
If*(b)							x	x		x		x		x	
If*(c)												x			
If*(d)			x												
If*(e)										?		x			
If*(f)		x										x			
If*(g)												x			
If*(h)															
IIa6	x					x		x	x	x	x		x		x
IIa7	x		x		?	x		x	x	x	x	x		x	x
IIa*(a)	x			?		x			x		x	x			x
IIa12					x	x	x	x	x	x	x	x		x	x
IIa19						x						x			
IIa27						x		x			x				
IIa*(b)											?	x			
IIa*(c)	?					x			x	x				x	
IIa*(d)	x					x			x	x		x			
IIa*(e)									x						
IIa41						x		x	x	x				x	
IIa*(f)									x	x				x	x
IIa55	x			x		x		x		x	x			x	x
IIa56	x					x		x	x	x	x	x		x	x
IIb*(a)												x	x		
IIbb*(a)						x		x			x				x
IIf*(a)												x			
IIf*(b)															
IIIa1								x						x	x
IIIa3			x		x	x		x	x	x	x		x		x
IIIb*(a)															
IIIf2		x	x		x		x			x		x		x	x
IIIf*(a)															
IIIf*(b)			x									x		x	
IIIf*(c)		x					x					x			
IIIf*(d)		x												x	
IVa5	x				x	x		x	x	x	x		x	x	x

Table 3. Continued.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
WIa1															
WIb*(a)	x	x	x		x	x	x	x		x			x	x	x
WIb1		x	?		?	x		x	x	x	x				x
WIb4	x		x	x	x	x		x	x	x	x			x	x
WIb11			x		x				x			x			x
WIb*(b)															
WIb16		x	x	x	x	x	x	x		x		x	x	x	x
WIc3				x	x	x		x	x	x	x		x		x
WIc11					x									x	x
WIc*(a)				x		x									x
WId*(a)							x								x
WId*(b)							x		x		x			x	
WId1	x					x		x	x	x					x
WId*(c)					x				x			x		x	x
WId*(d)															
WId*(e)						x			x		x	x			x
WIIb*(a)					x					x	x			x	
WIIc2	x			x	x	x		x	x	x	x		x	x	x
WIIc3			x			x		x	x		?				x
WIIc12	x			x	x	x		x	x	x	x				x
WIIf*(a)						x									x
WIIf*(b)					x									x	x
WIIf*(c)															
WIIf*(d)								x		x			x		x
WIIf*(e)														x	
WIIq*(a)															
WII**(a)															
WIIIa*(a)														x	
WIIIa*(b)			x							x				x	
WIIIb*(a)						x							x	x	x
WIIIb*(b)									x						
MPI**(a)															
MPIIa*(a)			x									x		x	
MPIIa*(b)												x			
MPIIa*(c)			x							?					
MPII**(a)															
MPII**(b)															
MPII**(c)															
PM**(a)															
Coral															x
Carnelian		x			x	x									x
Total	13	9	13	7	16	31	10	25	29	29	22	27	13	32	36

Table 4. Temporal Ranges of the Diagnostic St. Eustatius Beads.

Bead code	Site date range	Core dates[1]	Mode	Site sample
Period I				
IIb*(a)	1717-1860	1722-1752	1738	5
IIbb*(a)	1640-1836	1700-1740	1700	20
IIIb*(a)	1672-1807	---	---	1
WIb4	1660-1894	1700-1775	1730	28
WIb16	1672-1910	1720-1780	1735	20
WIb*(a)	1630-1910	1700-1805	1738	26
WIc-all	1670-1869	1700-1805	1740	29
WId1	1660-1900	1700-1775	1735	14
WId*(a,c,e)	1670-1900	1700-1780	1750	10
WIIb*(a)	1670-1833	1719-1730	1725	2
WIIc, WII**	1650-1833	1700-1760	1730	42
WIIf-all	1700-1845	1715-1830	1750	10
WIIIb*(a)	1672-1807	1700-1780	1730	12
WIIIb*(b)	1715-1821	1790-1800	1795	4
Coral	1545-1800	1625-1675	1662	18
Carnelian	1700-1910	1700-1820	1748	5
Period II				
If, IIIf	1680-1910	1805-1860	1830	36
WIb11	1700-1910	1715-1885	1860	7
WIIq*(a)	1787-1898	1803-1820	1812	4
WIIIa*(a,b)	1719-1875	1820-1870	1852	5
MPIIa	1803-1911	1825-1865	1845	6
MPII**	post-1825	---	---	0
Period III				
Ic*(a)	1834-1930	1870-1915	1900	5
MPI**(a)	1918-1933	---	1925	2
PM**(a)	1840-pres.	---	---	0

[1]The optimal period of bead utilization based on the relative frequency of sites producing each bead type or variety over time.

Dutch merchants never even set foot (if there is such a place!).

The Period I glass beads excluded from the "Dutch" assemblage were almost certainly produced in Venice. The coral specimens may have been produced in Amsterdam as evidence for such an industry has been found there (personal observation). The carnelian bead most likely originated in Cambay or some other Indian beadmaking center (Francis 1982), although the famous gem-cutting towns of Idar-Oberstein are also a possibility (Trebbin 1985).

The beads that represent Periods II and III were produced in several European beadmaking centers. The wound specimens — WIb11, WIIq*(a) and WIIIa*(a,b) — most likely originated in Venice, while the Ic and MP varieties were undoubtedly manufactured in Bohemia (Ross 1989a; 1989b). The drawn-faceted types (If, IIIf) are known to have been fabricated in both Venice and Bohemia (Francis 1979a: 11; 1979b: 13). The Prosser-Moulded bead, PM**(a), may also have been made in Bohemia, but France is also a strong possibility (Sprague 1983).

BEAD ACQUISITION

Beads could have come into the hands of the slaves living on St. Eustatius in a number of ways. Beads were probably already in the possession of some slaves at the time of their capture and simply accompanied them to the New World, as seems to have been the case with an Obeah (folk doctor) necklace found at the Newton Cemetery on Barbados (Handler, Lange and Orser 1979:6). It also appears to have been common practice (at least during the late 18th and early 19th centuries) for slave-ship captains to furnish beads to their female captives "for the purpose of affording them some amusement" (Dow 1969: 145, 185; Handler and Lange 1978: 147). "But,", adds one 18th-century observer, "this end is generally defeated by the squabbles which are occasioned in consequence of their stealing from each other" (Dow 1969: 145).

Once on a plantation, slaves might receive presents of money, as well as clothing and comestibles, on holidays and other festive occasions and this could have been used to purchase beads and other baubles from local merchants (Lewis 1834: 125, 238, 343). Slaves who were "tolerably industrious" were also able to earn a respectable income selling garden produce, poultry, pigs and even cattle which they grew and bred during their free time (Handler 1974: 35; Lewis 1834: 110, 112, 201-202). Such individuals could easily afford whatever ornaments they wanted.

Freed slaves and those born after the abolition of the plantation system would normally have had to purchase their beads, although some may have been acquired through inheritance.

BEAD USE ON STATIA

Information concerning bead use by the local population is practically non-existent, being restricted to 23 small circular drawn beads found in the neck region of an adolescent or juvenile human burial of unknown sex or race that was encountered in an unmarked cemetery near the Dutch Reformed Church in Upper Town. The burial may have been interred during the smallpox epidemic of 1776 (Dethlefsen 1982: 78). Of four varieties — IIa7 (3), IIa12 (13), IIa19 (1) and IIa56 (6) — the beads compose just under five linear centimeters when strung. Consequently, it is not clear if they were worn thus as a brief necklet, strung in a necklace with organic components such as thin-walled seeds that have subsequently rotted away, or utilized in some other, altogether different manner.

Fortunately, there is a relative wealth of historical and archaeological data from some of the other Caribbean islands that indicates how beads may have been utilized on Statia during the late 17th through early 19th centuries. Information concerning bead use during the rest of the 19th century and the early 20th century is currently lacking. Among the earliest evidence is a necklace found with an adult burial interred at the Newton Cemetery on Barbados during the latter part of the 17th century. The ornament was composed of 54 drawn and wound beads of medium and large size, as well as a single, very large, oblong-faceted bead of carnelian. The glass beads were mostly blue in color with black, white/clear and decorated (black with a white lattice-work) specimens interspersed (Handler, Lange and Orser 1979: 16, Fig. 2).

A few decades later, Griffith Hughes (1750: 16) observed:

> Our Slaves, in their Mirth and Diversions, differ according to the several Customs of so many Nations intermixed: However, all agree in this one universal Custom of adorning their Bodies, by wearing Strings of Beads of various Colours, intermixed sometimes by the richer sort of House Negroes with Pieces of Money. These Beads are in great Numbers twined round their Arms, Necks, and Legs.

When glass beads could not be obtained, the seeds of the "moabite" or "mangrove-beard tree" and Job's Tears were "strung upon silk" to serve as bracelets, while the nut of the "palm-oil tree," "being bored and emptied of its Kernel, is much worn by several Nations of Negroes, by way of Ornament, about their Necks" (Hughes 1750: 111, 193, 250).

Viewing newly arrived slaves at Carlisle Bay, Barbados, in 1796, General William Dyott noted that "the females had all a number of different-coloured glass beads hung round their necks" (Jeffery 1907: 93). At the same location five years later, the ship carrying Lady Nugent, wife of Sir George Nugent, Lieutenant Governor of Jamaica, was "immediately surrounded by boats, with naked men and women covered with beads..." (Cundall 1939: 10). In January of 1816, Matthew G. Lewis (1834: 74) commented that the holiday clothes of both his male and female slaves at Cornwall, Jamaica, "were chiefly white; only that the women were decked out with a profusion of beads and corals, and gold ornaments of all descriptions."

Illustrations depicting slave women at about this time show very large oblate/round beads being worn in bracelets, as well as choker-fashion, usually one strand, occasionally two, at a time (Cundall 1939: Fig. opp. p. 162; Dow 1969: Fig. opp. p. 118). Further investigation should resolve how much of this reflects reality and not the whims of the artist or engraver.

While the statement made by Lady Nugent in 1801 suggests that both men and women adorned themselves with beads, the general impression is that females were the principal users. It will be interesting to see if further research bears this out.

Beads not only served for adornment but were also incorporated into the regalia of Obeah-men, best described as physician-conjurors or folk doctors. One such item in use on Jamaica in 1818 is described by Lewis (1834: 356) as "a string of beads of various sizes, shapes, and colours, arranged in a form peculiar to the performance of the Obeah-man in the Myal dance." An actual example of such a strand was found at the Newton Cemetery, Barbados, in association with burial 72, that of an elderly male who the excavators suspect was an Obeah practitioner during the latter part of the 17th century (Handler, Lange and Orser 1979: 16). Worn as a necklace, the strand comprised 5 fish vertebrae, 7 cowrie shells, 21 dog canines, an oblong octagonal-sectioned carnelian bead, a round light gold drawn bead (IIa17), and three varieties of pentagonal-faceted wound beads: WIIc2 - light gray (9), WIIc4 - pale blue (1) and WIIc12 - bright navy (2) (Handler, Lange and Orser 1979: 16). The investigators believe that the necklace and a number of the other grave goods found with burial 72 originated in Africa (Handler and Lange 1978: 131).

Observations made by visitors to West Africa during the late 18th and 19th centuries provide additional clues concerning potential bead use on St. Eustatius. Necklaces were a popular form of adornment among the women who wore them in various forms and quantities. At Quappa Ebo in 1795, Joseph Hawkins (1797: 89) noted that "the women wear beads of glass and metal, with little plates, and other figures suspended from their necks in successive strings falling over their breasts."

An unidentified Englishwoman living in Sierra Leone in 1841 was quite taken with the lavish adornments of a local woman:

> This woman was a Maroon,... with a passion for ornaments I never saw equalled. A necklace of large rough pieces of coral, another of smaller beads of the same bright substance, one of oval lumps of amber nearly as large as a hen's egg, and sundry strings of variously-coloured glass beads, appeared by turns round the kerchiefless and wrinkled neck, and were exhibited no doubt as a mark of riches (Norton 1849: 32-33).

The ornaments encountered in Dahomey in 1849-50 were summarized as follows by Frederick E. Forbes (1966: 28):

> According to rank and wealth, anklets and armlets of all metals, and necklaces of glass, coral, and Popoe beads, are worn by both sexes. The Popoe bead is of glass, about half an inch long, and perforated. It is dug up in a country inland of Popoe, and cannot be imitated: all attempts hitherto have been detected.

At the end of the century, Richard A. Freeman (1898: 396, 399) found that, among women on the Guinea Coast,

> Necklaces are universal and their variety is infinite. In the more civilized districts they are generally composed of beads, in the stringing and arrangement of which remarkable taste is often exhibited, and the necklaces so produced are in many cases extremely elegant, especially when the handsome Venetian beads are used. Sometimes the necklace consists of a piece of string on which two or three valuable beads are

strung, or in some cases the string carries a single Aggri bead which is secured by a knot.

Other beaded ornaments encountered by Freeman (1898: 406, 407) included finger rings "produced by threading minute beads on cotton" which were especially favored by children; ear ornaments composed of "strings of beads;" and leg ornaments consisting of "a string carrying a single bead" which "encircles one leg, usually the right, just below the knee."

Hair was also adorned with beads by some African tribes as recorded by T.E. Bowdich (1819: 438) in Gabon:

> The whiskers of the men, and the side locks both of them and the women, hang down in narrow braids, sometimes below their shoulders, the ends commonly tipped with small beads, and the front locks are generally braided to project like horns.

At Sierra Leone in 1786, John Matthews (1788: 107-108) found that girls wore "a belt or girdle of beads, or loose strings of them tied round their waist." However, as these items were worn in combination with a *tuntungeé*, a sort of loincloth that was their sole covering, it is unlikely that they would have been utilised in the Caribbean where the slaves were usually made to wear European-style garments.

Beads also served to decorate various objects such as drums (Hawkins 1797: 100) and gourd rattles (Bowdich 1819: 364). It is not known if objects continued to be decorated in this way once the Africans arrived in the Caribbean.

The beads that were excavated on St. Eustatius were not all necessarily used or intended for use by slaves and Free Blacks. Members of the minority white population probably also utlized them to some degree. Examples of potential applications appear in the diary kept by Lady Nugent. On February 1, 1802, she mentions "stringing beads, which is now one of my occupations" (Cundall 1939: 76). Unfortunately, her ladyship does not elaborate on this activity, merely adding that she occasionally set visiting ladies and gentlemen to this task when unable or uninspired to entertain guests (Cundall 1936: 76, 87).

Lady Nugent's young children apparently wore beads native-fashion while on Jamaica as "their ankles, arms, and necks, were covered with beads" upon their arrival in England in September of 1805 (Cundall 1939: 321). Such use may have been prompted by a Black nanny who employed beads in the same way.

CONCLUSION

The beads excavated on St. Eustatius provide insight concerning the beads imported into the Caribbean during the 18th through early 20th centuries. Most of these were probably supplied by the Dutch and it will be interesting to see how the Statia assemblage compares to those from contemporary Dutch colonies in other parts of the world.

Information concerning bead use on Statia in very limited. Excavation of the unmarked cemetery near the Dutch Reformed Church would help to rectify this situation.

Precise archaeological dating of the Statian beads is presently lacking because most of the specimens were found in mixed 18th- and 19th-century contexts. Careful analysis of the ceramics and other associated artifacts from the different bead-producing layers should permit the refinement of the temporal chart presented in Table 4. It is also hoped that it will be possible to excavate more undisturbed 18th-century sites, such as the Waterfort with its "slave house," to further refine the Statian bead time chart.

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BOHEMIAN GLASS BEADMAKING: TRANSLATION AND DISCUSSION OF A 1913 GERMAN TECHNICAL ARTICLE

Lester A. Ross
Initial translation by Barbara Pflanz

This report provides an English translation of a German technical article on late 19th-century and early 20th-century Bohemian glass-bead manufacturing, published in 1913 in the journal Sprechsaal. *The article emphasizes the description of techiques for the manufacture of mould-pressed beads, secondarily describing methods for wound, blown and drawn-bead manufacturing.*

INTRODUCTION

This is a translation and discussion of an article published in 1913 in the German technical journal *Sprechsaal* (Anonymous 1913a). A similar article also appeared in 1913 in *Keramische Rundschau und Kunst-Keramik* (Anonymous 1913b), but because of its brevity and similarity to the *Sprechsaal* version, it has not been included in this report. *Sprechsaal* was a semiannual technical publication created by Jacob Müller in 1868; while *Keramische Rundschau und Kunst-Keramik* was a ceramic-industry technical series. Unfortunately, neither article identified its author, the name of the manufactory, the region in Bohemia (presently western Czechoslovakia) where the manufactory was located, nor the dates for the original observations.

Disagreements in details between these articles are nonexistent. While the *Sprechsaal* article provides relatively expansive information, the *Keramische* article is brief. Minor variations do exist in the choice of technical terms used, but the differences are minor. Both articles were probably written by the same author; however, the *Keramische* article could have been authored by a second writer extracting information directly from *Sprechsaal.* Because of the similarity of terminology and conformity of subject matter, information in both articles should be regarded as historically equivalent.

For reader evaluation, both the German version of the *Sprechsaal* article and its English translation are provided. Words with equivocal meanings are *italicized*, indicating precise technical equivalents were not found in 19th- or 20th-century German language dictionaries (*see* the References Cited section for sources consulted). Illustrations are reproduced as published, albeit at a different scale and with minor enhancements of faded lines. Paragraphs and sentences have been numbered to assist citation of specific portions of the document. Comments and insertions made by the author/translator are noted in square brackets, and original pagination is provided to assist proper attribution when sections are cited.

The primary purpose of this translation is to provide an historic context for the manufacture of mould-pressed beads observed by historical archaeologists on North American sites. Beads of this type were first encountered by the author in 1972 during an archaeological excavation of the Hudson's Bay Company's Fort Vancouver. This resulted in an initial description of the bead type as a "mandrel wound" bead with a composite hole formed by molding and punching (Hoffman and Ross 1973). Later, when more examples had been examined, identification of the bead type was modified to a "mandrel pressed" bead with a composite hole formed by moulding and punching (Ross 1974; 1976). Subsequent discussions with glass bead researchers resulted in the inclusion of this bead form within the broader manufacturing type identified as mould-pressed beads (Karklins 1982; Sprague 1985). Because of the unique attributes of early forms of Bohemian faceted, spherical, mould-pressed beads (e.g., multiple-mould and glass seams, a punched hole, and moulded biconical holes), and because of the apparent evolution of this bead type throughout the 19th and 20th centuries, mould-pressed beads may serve as temporal markers for dating archaeological sites (Ross 1989). Knowledge of pertinent historical documents is required to evaluate the chronology, and the following translation is provided to assist this endeavor.

Sprechsaal German Article (Anonymous 1913a)

Nr. 4 - 52 [at top of page]

Von der Fabrikation der böhmischen Glasperlen

(Nachdruck verboten)

[§1]

[1.1] Die Glasperlenerzeugung in Böhmen hat sich namentlich von dem Jahre 1850 an, zuerst nur langsam, dann aber in den folgenden Jahren schneller entwickelt.

[1.2] Zuerst wurden die Glasperlen nur in Eisenformengepreßt, die sehr primitiv von den Schlossern hergestellt waren (Figur A), und zwar die kleineren von Nr. 0-6 in *Doppelkappelformen* (2 Perlen nebeneinander), die größeren, von Nr. 7 an bis zu den größten Perlen, nur in einfachen *Kappelformen*.

[1.3] Jeder Glaspresser konnte sich damals eine verdorbene Form durch Nachbohren mit einem *Rundbohrer* wieder selbst vorrichten.

[1.4] Gepreßt wurde damals schon, wie heute noch, von ca. 3-3-1/2 cm starken und ca. 100-150 cm langen runden Glasstangen, die in einem eigens dazu erbauten *Druckofen* (Figur B) angewärmt und geschmolzen wurden.

Nr. 4 - 52[/]53

[§2]

[2.1] Gearbeitet wird gewöhnlich von 2 oder 3 nebeneinander liegenden Glasstangen.

English Translation

Number 4 - page 52

Concerning the Manufacture of Bohemian Glass Beads

(reproduction prohibited)

[§1]

[1.1] Glass bead production in Bohemia, particularly from 1850, developed slowly at first, then more rapidly in subsequent years.

[1.2] Initially, glass beads were merely pressed in iron moulds [i.e., tong moulds] fabricated in a very primitive fashion by metal workers (Figure A). The smaller of these beads (from Nos. 0 to 6) were pressed in *double mould plates,* whereas larger ones (from No. 7 up to the largest) required only single *mould plates.*

[1.3] Every glass presser at that time was able to repair a worn out mould himself by re-boring it with a *ball burr.*

[1.4] Round glass canes, approximately 3 to 3.5 cm in diameter and approximately 100 to 150 cm long, were employed at that time for pressing, and are still in used today. These canes were heated and melted in a *pressing oven* [i.e., an oven used by mould-pressed beadmakers to partially melt their glass canes] (figure B) that was built especially for this purpose.

Number 4 - page 52/page 53

[§2]

[2.1] Generally, the process involves using 2 or 3 glass canes lying next to one another.

[2.2] Sobald nämlich das Glas an dem vorderen Ende der Glasstange im Ofen geschmolzen ist, nimmt der Glaspresser die letztere aus dem Ofen, führt sie an die Form und preßt soviel Mal Perlen ab, als die erhitzte Partie noch [52/53] weich genug ist.

[2.3] Währenddessen ist bereits eine zweite Glasstange im Ofen soweit geschmolzen; der Presser legt die erste in den Schmelzofen zurück und nimmt die zweite, um wieder Perlen abzupressen.

[2.4] Dies wiederholt sich nun während der ganzen Arbeitszeit.

Nr. 4 - 53

[§3]

[3.1] Die gepreßten Perlen werden je nach ihrer Größe entweder in den Kühltopf im oberen Kühlraum des *Druckofens* oder in einen Behälter neben dem Ofen gegeben.

[3.2] Sobald sie gekühlt sind, werden sie in einem länglichen schmalen Sack aus roher Leinwand geschüttelt, die Glasbrocke fällt ab, und die Perlen sind rein.

[3.3] Früher wußte man noch nicht, daß die Perlen mit einem ganz durchstochenen Loch erzeugt werden könnten; der etwas konisch gehaltene Stechdorn in der Form ging nur in die untere Hälfte der Perlenform in eine Vertiefung, die, wie nebenstehende Figur zeigt, nach außen eine Spitze bildete.

[3.4] Es mußten sonach die abgeschüttelten Perlen jede einzeln mit einem Dorn durchgeschlagen werden, damit der *Pitzelansatz* weg sprang, dann war erst die Perle beiderseitig offen.

Nr. 4 - 53

[§4]

[4.1] Diese Rohperlen wurden dann entweder eckig geschliffen in den verschiedenartigen Schliffarten, oder nur in dem Verwärmofen (Figur D) verschmolzen, so daß der Brockenrand an den Perlen glatt und rund wurde.

[2.2] As such, as soon as the glass on the front end of the cane in the oven has melted, the glass presser removes the latter from the oven, takes it to the mould and presses off as many beads as the softness of the heated portion will allow.

[2.3] In the meantime, a second glass cane in the oven has melted sufficiently; the presser places the first cane back into the melting oven, takes the second one, and again presses off beads.

[2.4] This process is repeated during the entire work period.

Number 4 - page 53

[§3]

[3.1] Depending upon their size, the pressed beads are placed either in a cooling pot in the upper cooling chamber of the *pressing oven* or in a container next to the oven.

[3.2] As soon as they have cooled, they are placed in a long narrow sack, made of rough linen, and are shaken. The glass fins fall off, and the beads are clean.

[3.3] In these earlier times, it was not yet realized that beads could be made with a hole completely through them. In the mould there was a somewhat conically-shaped pin that penetrated only the lower half of the bead mould, entering a hollowed-out section ehich then, as the adjacent figure [Figure 1] shows, then formed a pointed protrusion on the opposite side.

[3.4] After the beads had been shaken, they had to be pierced individually with a pin, causing the *nipple-like extension* to detach. Not until then was the bead open on both sides.

Number 4 - page 53

[§4]

[4.1] These unfinished beads were then either angularly ground, using one of the various cutting methods, or merely fire-polished in the warming oven (Figure D), so that the irregular exterior of the beads became smooth and round.

[4.2] Das Verschmelzen geschah damals in folgender Weise auf der sogenanten (sic: sogenannten] Vermärmscheibe (Figur C).

[4.3] Diese besteht aus einem etwa 1 cm starken Eisenteller von 25 cm Durchmesser, auf dem Eisenstifte angebracht sind, die nach der Spitze zu etwas konisch verlaufen.

[4.4] An der Unterseite des Tellers befindt sich ein Eisenstab von 1 m Länge, der im Mittelpunkt des Tellers angeschraubt ist.

[4.5] Bei Beginn der Arbeit wurden zuerst die Eisenstifte durch Einführen der Verwärmscheibe in den Ofen stark erhitzt, dann in einen Topf getaucht, worin sich eine dickflüssige Mischung von Kalk oder Ton befand.

[4.6] Von dieser legte sich eine feine Schicht an den Stiften an, worauf man die Kochperlen auf die Stifte aufsteckt und die Verwärmscheibe in die obere Vorwärme des Ofens brachte. (Figur D).

Nr. 4 - 53

[§5]

[5.1] Nachdem die Perlen genügend vorgewärmt waren, nahm der Arbeiter die Scheibe in die untere Schmelzhalle.

[5.2] Vor dem Ofen war ein Eisenstab angebracht, der oben eine gebogene Führung hatte, worin der Stab der Verwärmscheibe zu liegen kam.

[5.3] In dem Ofen wurde nur trockenes langgespaltenes Holz geschürt, das eine reine Flamme erzeugte und die Perlen auf den Stiften der Scheibe umspülte.

[5.4] Hierbei drehte man die Scheibe fortwährend langsam, damit sich alle Perlen gleichmäßig verrundeten.

[5.5] Bei einem gut geheizten Ofen war das Abrunden und Verschmelzen des Brockenrandes sehr schnell fertig.

[5.6] Wenn der Arbeiter die Perlen auf den Stiften für gut befand, so hob er die Scheibe aus dem Ofen und legte sie auf ein nahes Gestell zum Abkühlen.

[4.2] At that time, fire-polishing was accomplished on a so-called warming disk (Figure C) using the following method:

[4.3] This warming disk consisted of an iron plate approximately 1 cm thick and 25 cm in diameter. Iron pins with points of a somewhat conical shape were mounted on this disk.

[4.4] On the underside of the disk is an iron stem, 1 m in length, which is screwed onto the center of the disk.

[4.5] At the beginning of the process, the iron pins were first intensely heated by placing the warming disk into the oven. The disk was then dipped into a pot containing a thick liquid mixture of lime or clay.

[4.6] The pins were thus coated with a fine layer of this mixture, whereupon heated beads were pushed onto the pins and the whole warming disk was placed in the upper warming chamber of the oven (Figure D).

Number 4 - page 53

[§5]

[5.1] After the beads had been heated sufficiently, the worker placed the disk in the lower melting chamber.

[5.2] An iron rod was mounted in front of the oven. At its upper end this rod had a curved guide into which the rod of the warming disk could be placed.

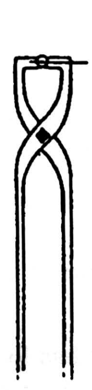
[5.3] Because it produced a clean flame which enveloped beads placed on the pins of the disk, only dry wood, split lengthwise, was burned in the oven.

[5.4] During this process, the disk was rotated constantly and slowly, so that all beads were rounded evenly.

[5.5] With a well-heated oven, fire-polishing and rounding off of the irregular exteriors could be accomplished quickly.

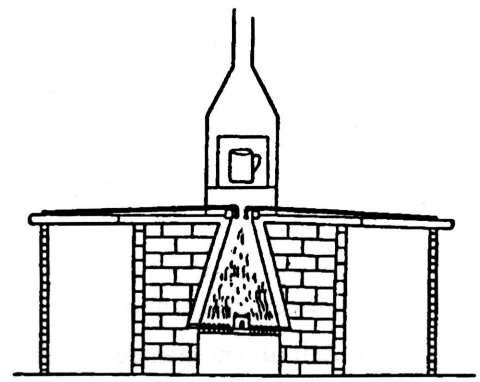
[5.6] As soon as the worker determined that the beads on the pins were ready, he removed the disk from the oven and laid it on a nearby stand for the cooling-off process.

Figure 1.



Figur A.

Figure A.

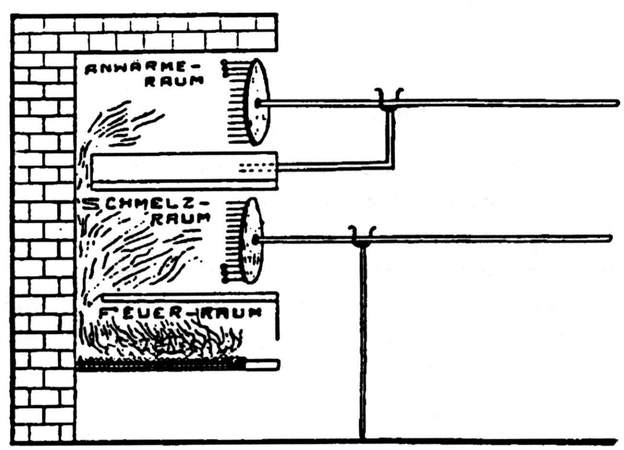


Figur B. Druckofen-Durchschnitt.

Figure B. Pressing Oven - Cross-section

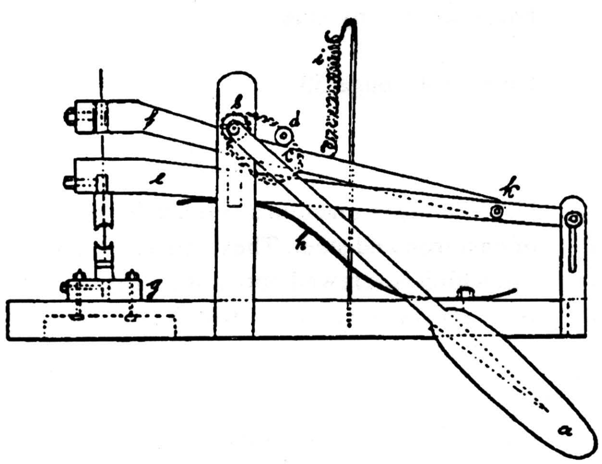
Figur C.

Figure C.



Figur D. Vorwärmofen, Durchschnitt.

Figure D. Warming Oven, Cross-section



Figur E. Stechmaschine, Seitenansicht.

Figure E. Piercing Press, Side view

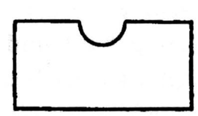


Figure 2.

[5.7] Sobald die Perlen etwas gekühlt waren, wurden sie durch Anschlagen mit einem kurzen Eisenstab an die Scheibe zum Abfallen in einen großen Topf, der mit Holzasche gefüllt war, gebracht und nach erfolgter Abkühlung geputzt and angefädelt.

[5.7] As soon as the beads had cooled somewhat, they were loosened by rapping the disk with a short iron rod. This caused them to fall off into a large pot filled with wood ashes, and after further cooling they were cleaned and threaded.

[5.8] Früher hatte man noch keine mit Schliffecken und *Gravierungen* versehene gepreßte Perlen, während man es im Laufe der Zeit durch fortwährende Verbesserungen an Formen und Maschinen zu den vollendetsten Erzeugnissen gebracht hat.

[5.8] Formerly, beads with ground facets and *relief designs* were not pressed; but through time, continual improvements in moulds and machines made it possible to produce almost perfect creations.

[5.9] Schon längere Zeit nimmt man den besten Stahl und das beste Nickelmetall für Formen und *Einsetzkappel* für die Maschinen, so daß die gepreßten Perlen und *Façonsachen* wie geschliffen aus den Formen oder von den Maschinen kommen.

[5.9] It has long been customary to use the best steel and the best nickel for the moulds and *inset mould plates* of the machines, so that pressed beads and *other moulded articles* came out of these machines as if they were cut.

Nr. 4 - 53

Number 4 - page 53

[§6]

[6.1] Seit mehreren Jahren arbeitet man mit Preßmaschinen (Figur E), wovon es zwei Systeme gibt, und zwar die *Oberstechmaschine*, mit welcher Perlen und andere Artikel mit senkrechtem Loch gestochen werden, dann Seitenstechmaschinen, die wagerecht [sic: waagerecht] von der vorderen oder rückwärtigen Seite die Löcher in die zu pressenden Artikel sticht.

[6.1] For the last several years, pressing machines of two different types have been used (Figure E): 1) a *vertical piercing* machine, with which beads and other articles requiring a perpendicular hole could be pierced, and 2) lateral piercing machines, which pierce holes horizontally from the front or rear of the article being pressed.

[6.2] Auf letzteren werden nur längliche verchiedenartig geformte Artikel, wie Oliven, Platten, rechteckige und runde flache Artikel mit längeren in beliebiger Zahl nebeneinander angeordneten Löchern gestochen.

[6.2] Only elongated, irregularly-shaped articles, such as olive-shaped and platter-shaped, rectangular and round-flat articles, were placed in the latter machines and pierced with an optional number of longer holes set side by side.

Nr. 4 - 53

Number 4 - page 53

[§7]

[7.1] Die Preßmaschinen (Figur E) sind kräftig aus Eisenguß und Stahl gebaut und bestehen aus dem Druckhebel a, welcher an der Welle b festgeschraubt ist; an letzterer befindet sich ein Exzenter c und an diesem ein kleines Rädchen d.

[7.1] Pressing machines (Figure E) are sturdily-built of cast iron and steel. They consist of a pressure level (a), which is screwed onto a shaft (b); and on the latter is an eccentric (c), upon which is a small rowel (d).

[7.2] Ferner sind der Preßhebel e, in den das obere *Formenkappel* eingeschraubt ist, und der Stechhebel f, welcher bei k in dem Preßhebel lagert, vorgesehen.

[7.2] In addition, there is also the pressing lever (e) into which the upper *mould plate* is screwed, and the piercing lever (f), which is attached to the pressing lever at (k).

[7.3] In dem Stechhebel sind die Stahlnadeln zum Stechen eingeschraubt und unter dem Preßhebel e ist eine flache Stahlfeder angebracht, während an dem Stechhebel f sich eine Spiralzugfeder befindet.

Nr. 4 - 53

(§8]

[8.1] Der untere Teil der Maschine besteht aus einer verschiebbaren Eisenplatte g, in welcher das untere *Formenkappel* mit einer Schraube befestigt ist.

[8.2] Dieses untere *Formenkappel* wird mit dem oberen sehr genau in eine Richtung gebracht, worauf die Stechnadeln eingesetzt werden; nun ist die Maschine zum Arbeiten fertig.

[8.3] Das Pressen geschieht nun folgendermaßen: Der Arbeiter (Glasdrucker) führt in der rechten Hand den Druckhebel a, in der linken hält er die geschmolzene Glasstange, bringt sie aus dem Ofen an die *Formenkappeln*, drückt dann kräftig den Druckhebel nach abwärts und wiederholt dies eben so oft, als das an dem vorderen Ende der Glasstange geschmolzene Glas noch weich ist und sich verarbeiten läßt.

Nr. 4 - 53

[§9]

[9.1] Beim Abwärtsdrücken des Druckhebels a drückt der Exzenter c auf den Preßhebel e und das kleine Rädchen d an dem Exzenter auf den Stechhebel f.

[9.2] Durch den Druck schließen sich die beiden *Formenkappeln* genau zusammen und formen die Perlen oder sonstigen Artikel; beim Aufheben des Druckhebels drückt die Stahlfeder h den Preßhebel in seine frühere Lage zurück, während die Spiralzugfeder i den Stechhebel zurückzieht.

Nr. 4 - 53

[§10]

[10.1] Die Hauptfabrikation auf diesen Maschinen bilden die eckig geformten, sogenannten englischen Schliffperlen und die Rundperlen.

[7.3] Steel needles are screwed into the piercing lever for piercing. Fastened under the pressing lever (e) is a flat steel spring [h], whereas on the piercing lever (f) is a coiled draw-spring [i].

Number 4 - page 53

[§8]

[8.1] The lower section of the machine consists of a moveable iron plate (g), on which a lower *mould plate* is fastened with a screw [apparently with two screws; *see* illustration].

[8.2] This lower *mould plate* is brought precisely into line with the upper one, into which the piercing needles are inserted. Now the machine is ready to be used.

[8.3] Pressing is conducted in the following manner: The worker (glass presser) takes the pressure lever (a) into his right hand; in his left he holds the melted glass cane, which he takes out of the oven and brings to the *mould plates*. He then presses forcefully down on the pressure lever and repeats this process as long as the melted glass on the front end of the glass cane is still soft and can be worked.

Number 4 - page 53

[§9]

[9.1] As the pressure lever (a) is pressed down, the eccentric (c) presses on the pressing lever (e); and the small rowel (d) on the eccentric presses on the piercing lever (f).

[9.2] As a result of this pressure, the two *mould plates* close together precisely; and the beads or other articles are moulded. When the pressure lever is released, the steel spring (h) pushes the pressing lever back into its former position, while the coiled draw-spring (i) pulls the piercing lever back.

Number 4 - page 53

[§10]

[10.1] These machines are used primarily to mould angular, so-called, English cut beads and round beads.

[10.2] Die englischen Schliffperlen werden zumeist nach dem Pressen von den Glasbrocken durch Schütteln befreit, worauf man sie in einem kleinen Polierofen auf Tontellern nachpoliert.

[10.3] Auch werden bessere Qualitäten erzeugt, indem man die gepreßten Perlen an ca. 4-5 m lange schwache Messingdrähte anfädelt und an dem feinem Brockenrand auf Schleifrädern einige Schliffecken schleift, die dann eben auch im Polierofen poliert werden.

[10.4] Es werden auch von vorgeformten oder von runden gepreßten Perlen ganz feine Perlen geschliffen, die man dann entweder im Polierofen oder aber auf der Zinnscheibe poliert.

Nr. 4 - 53[/]54

(§11]

[11.1] Die Rundperlen bilden einen großen Teil der Fabrikation; sie werden in den Maschinen gepreßt, wie die englishchen Schliffperlen und zwar bis zur Größe von 6 mm in *Doppelkappeln,* die größeren in einfachen *Formenkappeln.*

[11.2] Diese Perlen werden ebenfalls nach dem Pressen abgeschüttelt und durch Sieben von den Glasbrocken gereinigt.

[11.3] Dann kommen sie behufs Glattschleifens in eine Trommel aus Holz oder Eisen, in welcher etwas Wasser mit feinem Sand sich befindet.

[11.4] Diese gefüllte Trommel wird mit kraftantrieb in langsame drehende Bewegung versetzt; in einigen Stunden sind alle Perlen schön glatt abgerundet, und von dem feinen Brockenrand ist nichts mehr zu sehen. [53/54]

[11.5] Hierauf werden sie entweder in einer Pappelholztrommel, in welche etwas Tripelmehl und Wasser gegeben ist, durch langsames Laufen der Trommel oder in einem kleinen Polierofen auf Tontellern poliert.

Nr. 4 - 54

(§12]

[12.1] Derartige Perlen werden aus den verschiedenartigsten Glasstangen erzeugt und zuweilen auch mit Farben dekoriert, z. B. mit Iris-, Gold-, Silber-, Lüster- und Bronzefarben.

[10.2] After the pressing operation, the English cut beads are generally freed of glass fins by shaking. Then they are repolished on clay plates in a small polishing oven.

[10.3] Higher quality is obtained when the pressed beads are threaded on long thin brass wires, approximately 4 to 5 m in length; and using a cutting wheel, several angular corners are cut on the fine broken edges. These angular cuts are then also fire-polished in the polishing oven.

[10.4] Very fine beads are also cut from preformed [prefaceted ?] or from round pressed beads. There are then polished either in a polishing oven or on a tin case.

Number 4 - page 53/page 54

[§11]

[11.1] Round beads constitute a major portion of production. They are pressed in machines, like the English cut beads, up to a size of 6 mm in *double mould plates,* with larger ones in single *mould plates.*

[11.2] These beads are likewise shaken after the pressing process, and are freed of glass fins by passing them through sieves.

[11.3] To give them a smooth polish they are placed in a drum made of wood or iron, in which there is a mixture of fine sand and water.

[11.4] This power-driven, filled drum is started up and runs with a slow rotating motion. Within several hours, all the beads are beautifully rounded and smooth; and no trace of the fine mould seam can be seen. [page 53/page 54]

[11.5] Hereupon, the beads are placed either in a drum made of poplar wood, in which there is some rottenstone flour and water, and are polished as the drum rotates slowly; or they are polished in a small polishing oven on clay plates.

Number 4 - page 54

[§12]

[12.1] Beads of this style are produced from different types of glass canes and are occasionally also decorated with colors; for example, with iridescent, gold, silver, luster and bronze colors.

Nr. 4 - 54

[§13]

[13.1] Die sogenannten Lampenperlen werden auf Lampentischen, an welchen sich unterhalb der Tischplatte ein Blasbalg befindet, an einer Gas- oder Kaiserölstichflamme gearbeitet.

[13.2] Das Glas in schwächeren Stengeln wird in der Stichflamme geschmolzen und auf Stahlnadeln, welche in Kalk- oder Tonwasser getaucht sind, aufgewickelt und zwar in der beliebigen Stärke einer Perle.

[13.3] Noch im ziemlich weichen Zustand wird dann die angewickelte Perle in einer habrunden Form (nebenstehende Abbildung) etwas nachgedreht.

Number 4 - page 54

[§13]

[13.1] The so-called lamp beads [i.e., wound beads] are produced over a gas or "Kaiseröl" [a rectified petroleum fuel with a flash point of 90-140° F] jet flame on lamp tables, which have bellows attached underneath the table top.

[13.2] Glass, in the form of thin canes, is melted in a jet of flame. Using steel needles dipped in lime or clay water, melted glass is wrapped around the needles to the desired thickness of a bead.

[13.3] While the bead on the needle is still quite soft, it is rotated again slightly in a hemispherical mould (see adjacent illustration) [Figure 2].

Nr. 4 - 54

[§14]

[14.1] Die Herstellung der Lampenperlen ist eine ganz andere, als die der Preßperlen, und es werden sehr schöne Muster gearbeitet.

[14.2] Auf denselben Tischen werden auch die Hohlperlen und hohle *Fassonsachen* angefertigt, und zwar aus hohlen Glasstengeln, welche in der Stichflamme an dem vorderen Ende zum Schmelzen gebracht werden.

[14.3] Es werden runde, ungeformte, auch Einlochperlen, dann geformte Perlen gemacht, welche mittels Blasmaschine in Messing- oder Nickelformen geblasen werden, je nach der Größe von 1-15 Stück auf einmal in einer Form.

Number 4 - page 54

[§14]

[14.1] The production of lamp beads is a completely different process from that of pressed beads, and beautiful examples are being made.

[14.2] The same tables are used for making blown beads and mould-blown articles. These are made from hollow glass canes, which are melted on the front end in the tongue of the jet of flame.

[14.3] Round, freeform, also single-hole beads, and moulded beads are made and blown into brass or nickel moulds by means of bellows. Depending upon their size, 1 to 15 pieces at a time can be produced in a single mould.

Nr. 4 - 54

[§15]

[15.1] Zumeist werden diese geformten Hohlperlen mit salpetersaurem Silber und auch Chlorgold eingezogen und bilden einen sehr großen Exportartikel.

Number 4 - page 54

[§15]

[15.1] Most of the time these blown beads coated with nitrate of silver or muriate/protochloride of gold are withheld from circulation [i.e., withheld from local markets], and constitute a very significant export item.

Nr. 4 - 54

[§16]

[16.1] Ferner sind die sogenannten Schmelzperlen, welche unter dem Namen *Doppelschmelz* für *Passementeriezwecke* verwendet werden, zu nennen.

Number 4 - page 54

[§16]

[16.1] In addition, so-called blowpipe [or enamel] beads, used for *embroidery designs* under the name "*Doppelschmelz*" [double enamel?], should be mentioned.

[16.2] Diese Perlen werden von sechskantig gezogenen Glasstengeln auf Sprengmaschinen abgesprengt, dann entweder nur auf Tontellern im Polierofen verschmolzen oder an schwachen Messingdraht (4-5 m lang) gefädelt und an der Seite eines Schleifrades entweder zwei- oder dreimal geschliffen und darauf in dem Polierofen auf Tontellern poliert.

[16.2] These beads are broken from drawn hexagonal glass canes using infernal machines. Then they are either merely fire-polished on clay plates in the polishing oven, or they are threaded onto fine brass wire (4 to 5 m long) and cut either two to three times on the side of a cutting wheel. After this they are fire-polished on clay plates in the polishing oven.

[16.3] Auch sind bereits für das Schleifen dieser Perlen Maschinen in Verwendung.

[16.3] Also, machines for cutting these beads are already in use.

Nr. 4 - 54

Number 4 - page 54

[§17]

[17.1] Die zweite Gattung sind die runden Rocailleperlen.

[17.1] The second type are the round rocaille beads.

[17.2] Diese werden ebenfalls, jedoch von runden, gezogenen Glasstengeln auf Sprengmaschinen abgesprengt und kommen dann nach diesem in einen eigens dazu erbauten Rollierofen zum Abrunden.

[17.2] These are likewise broken from glass canes, this time round-sectioned ones. After this, they are rounded off in a tumbler oven especially built for this purpose.

Nr. 4 - 54

Number 4 - page 54

[§18]

[18.1] Die Perlen werden erst in ein Gefäß gebracht, welches eine dickflüssige Kalklösung enthält, und so lange gerührt, bis sich die Löcher derselben mit Kalk gefüllt haben.

[18.1] The beads are first placed in a receptacle containing a thick lime solution and stirred until their holes have filled with lime.

[18.2] Dann werden sie in eine Eisentrommel gegeben, in welcher sich gestoßene Holzkohle und Meersand befinden; diese wird in den Rollierofen eingeführt und so lange über Holzfeuer gedreht, bis sich die Perlen verrundet haben.

[18.2] Then they are placed in an iron drum containing powdered charcoal and sea sand. This drum is put into the tumbler oven and rotated over a wood fire until the beads become smooth.

[18.3] Dieses Verrunden dauert nicht lange; nach fertiger Verrundung wird die Trommel aus dem Ofen gehoben und der Inhalt auf große, flache Blechpfannen geschüttet behufs Abkühlens der Perlen.

[18.3] This smoothing does not take long. After it is completed, the drum is lifted out of the oven and its contents shaken out into large, flat, tin pans for the purpose of cooling the beads.

[18.4] Nach dem Abkühlen werden die Perlen ausgesiebt und geputzt.

[18.4] After they have cooled, the beads are sifted and cleaned.

[18.5] Es werden dann die Löcher zumeist mit Silber und Gold eingezogen, auch vielfach mit anderen Farben dekoriert.

[18.5] The holes are then usually coated with silver and gold, and are often also decorated with other colors.

[18.6] Die Rundperlen werden sehr vielseitig verarbeitet; ihre Fabrikation stammt aus Venedig und ist erst im Jahre 1888 in Böhmen eingeführt worden.

[18.6] Round beads are made in various ways. Their manufacture originated in Venice and was first introduced into Bohemia in the year 1888.

DISCUSSION

Within the *Sprechsaal* article, four manufacturing types of glass beads are discussed:

1) Mould-pressed beads,
2) Wound beads,
3) Blown beads, and
4) Drawn beads.

The majority of the article focuses upon mould-pressed beads, treating the remaining three types as secondary. It is stated that Bohemian glass beadmaking developed slowly, particularly from 1850 (§ 1.1), suggesting that the industry is a 19th-century phenomenon. This observation appears false as stated, and may in fact reflect a 19th-century florescence of Bohemian mould-pressed-bead technology. Another temporal statement is that the manufacture of round, *rocaille* beads (§ 18.5 referring to § 17.1) originated in Venice, with an introduction to Bohemia in 1888 (§ 18.6). This late date may pertain to the manufacture of hot-tumbled, spherical, rocaille beads, but certainly not to the other round varieties of beads discussed (i.e., spherical, wound beads).

Previous historical researchers have provided adequate documentation for the early history of glass beadmaking in Czechoslovakia and Bohemia (*see* References Cited). Karel Hetteš (1958: 6, 9, 17) noted that glass jewels and buttons from the Moravian Empire existed in the 8th and 9th centuries, glass beads for rosaries were made on the Czech-Bavarian border in the 14th century, and Italian craftsmen had been employed by the 17th century.

In writing about the Jablonec region of Czechoslovakia, Zuzana Pešatová (1965) noted that the technical foundation for the glass-bead industry lay with the florescence of the artificial-jewelery industry. Replication of precious stones in glass was a major trade in Bohemia. By the mid-18th century, glass replicas were shaped initially with pressing tongs and finished by grinding. For the manufacture of minor glass articles, pressing tongs were in use even earlier:

> The discoveries made by Dr. Hajdová of the Industrial Arts Museum in Prague during the archeological investigation of the glasswork at Rejdice in the Jablonec region include — for the period towards the close of the 16th and in the early 17th centuries — a number of glass beads, both pressed and ground (in addition to beads and small buttons stringed on wire) (Pesatová 1965: 25).

Mould-Pressed Beads (§§ 1.2-12.1)

Beads of this type were manufactured individually or in small batches (§ 1.2) using iron tongs (§ 1.2 and Figure A), and later, pressing machines with multiform moulds (§§. 5.8-5.9, 6.1-6.2 and Figure E).

> If Czoernig can be belived in the twenties of the 19th century as many as about two and a half thousand million pieces were made for export alone. They were massive, full pearls, of considerable weight, with only a small hole perforated by means of the tongs in the course of the shaping operation (Pešatová 1965: 25).

Discussing developments in the Jablonec region during the 1820s and 1830s, Pešatová noted that:

> ... dies, metal craftsman's press and punch had been introduced in the Jablonec region, the manufacturers had learned how to fix pins onto brooches: the close of the thirties brought about a considerable increase in production as far as types of décors as well as shapes were concerned (Pešatová 1965: 27).

At least eight sizes (i.e., sizes 0-7) were made (§ 1.2), with each size denoted perhaps by its metric measurement. Comparing § 1.2 with § 11.1, it appears that bead sizes smaller than 6 mm (i.e., sizes 0-6) were made in double moulds. Thus, the largest small size, size 6, measured 6 mm. Perhaps size 1 beads measured 1 mm, and size 0 beads measured less than 1 mm. However, standard bead sizes may have been variable. Moulds were rebored when worn (§ 1.3), perhaps only slightly, or perhaps to the next larger size. Zuzana Pešatová (1965: 27) noted that one firm, F. Unger and Co. at Desná manufactured cut beads in 19 sizes.

In earlier periods (ca. mid-19th century), holes in these beads were not formed completely by the pressing process, and the remaining portion of the hole had to be pierced with a pin (§§ 3.3-3.4). Some glass articles (possibly including unique varieties of beads) could have multiple holes (§ 6.2). The fins (i.e., the glass that escaped along the mould seam) were removed by abrasion and sieving (§§ 3.2 and 11.2), with better quality beads having their fins removed by grinding and fire-polishing (§ 10.3).

Mould-pressed beads could be plain, have facets or designs cut or moulded on their surface, or could be decorated with colors (§§ 4.1, 5.8-5.9, 12.1). The firm of F. Unger and Co. manufactured cut beads in about 200 subtly varied colors (Pešatová 1965: 27), and only in the field of cut pearls did North Bohemia have a monopoly (Pešatová 1965: 26).

Round beads were the most commonly manufactured (§ 11.1), and at least one special variety of faceted bead was made; i.e., English-cut (§ 10.1; pentagonal beads with three rows of facets). In the early history of this technology (perhaps the mid-19th century), facets and designs were cut by hand, not pressed by the mould (§ 5.8). Beads could be finished roughly by tumbling or finely by fire-polishing (§§ 4.1, 11.3 and 11.5).

Wound Beads (§§ 13.1-14.1)

Beads of this type were wound on steel wires dipped in lime or clay (§ 13.2). Once wound, the warm, still-plastic bead was rotated within a semicircular mould (§ 13.3 and Figure 2). This shaping would have resulted in the creation of a perfectly spherical bead with a smooth surface, lacking the small tail of glass typical of wound beads.

Blown Beads (§§ 14.2-15.1)

Beads of this type were made from hollow tubes, heated and either blown freeform or into metal moulds (§§ 14.2-14.3). They were decorated with gold and silver, and intended primarily for export (§ 15.1). Zuzana Pešatová (1965: 26) noted that:

> Thin-walled hollow pearls blown in flame from a glass capillary tube have been in the Jablonec region since the last quarter of the 18th century. At first they were shaped only "off-hand" as balls, olives, pear shapes and the so-called "coques de perles" shapes, later on, since 1876, in a greater variety of profiles and more complex types also by using iron shapers with inserted heated tubes, this enabling the worker to produce whole rown of pearls at once. Their surface was either quite plain or decorated with a glass thread of another colour, either without inner coating or with one (paint, wax, essence d'orient, metal). In the fifties of the 19th century inside metal-coating achieved by the absorption of the silver nitrate was introduced by the Smrzovka physician Dr. Weiskopf. (The silver-coated pearl had originally been brought into the market by Paris makers but later on Jablonec managed to monopolize practically the whole of production while India was the chief buyer.) Yellow glass created a "gilded" effect.

Drawn Beads (§§ 14.2-18.6)

Two forms of drawn beads are mentioned: enamel beads (§§ 16.1- 16.3) and hot-tumbled, colored beads (§§ 17.1-18.6). Enamelled beads were probably chopped or incised and snapped from hexagonal canes, with additional facets ground on their ends (§ 16.2). Hot-tumbled, colored beads were cut from round canes, their holes were filled with a lime mixture, and the beads were smoothed by hot-tumbling in an iron drum with charcoal and sand (§§ 17.2 and 18.1-18.2). Upon cooling and cleaning, these beads were then colored by coating the interior surface of the hole with silver, gold and other colors (§ 18.5). Apparently, this type of bead was first made in Bohemia in 1888 (§ 18.6).

CONCLUSIONS

The *Sprechsaal* article provides an outstanding insight into a poorly documented 19th-century technology for the manufacture of mould-pressed beads. As an historical overview, it clearly identifies a general technology present in Bohemia during the late 19th and early 20th centuries, providing descriptions of a few of the variations employed to create holes and decorate bead surfaces. However, the descriptions contained herein fail to address many manufacturing variations employed in the early through mid-19th century and, as such, the article should not be regarded as a definitive statement on Bohemian mould-pressed beadmaking technology. Further elucidation of the technology, its variations in formative and decorative methods, and its myriad bead varieties must await discovery of additional historical works and descriptions of beads from tightly-dated museum collections and archaeological sites.

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BOOK REVIEWS

The History of Beads from 30,000 B.C. to the Present.

Lois Sherr Dubin. Harry N. Abrams, New York, 1987. 346 pp., 130 figs., 248 color figs. $60.00.

Probably the most important line in this work is on the title page: "Original Photography by Togashi." This will be the final word in coffee-table books on the subject of beads. It is not the final word on beads. The photography contained in the 248 (the dust jacket says 254) color plates is flawless. Fig. 169 is a rare exception but is still acceptable. Anyone who has attempted the photography of round glass beads can appreciate the time that has gone into these color plates. In no examples are the backgrounds distracting yet they are not uniformly bland as is so often the case in archaeological reports. The quality paper and printing have also obviously helped to bring out the artistic and technical talents of Togashi.

The black and white photographs tend to be more variable, in part probably due to the use of museum-supplied prints. On occasion the lack of contrast is annoying (Fig. 71) but the use of historic photographs is well done (Fig. 236 is a pleasing example).

Also included in the illustrative material are 15 maps from different geographical regions. Except for the first one, they all represent good projection choices. In general, they are crisp and professional in appearance but some of them (for example, the Far East, p. 155) are so "busy" that the non-professional reader or browser would be lost immediately. The maps for the early time periods take a definite Eurocentric view of the world and the important archaeological discoveries. The obscure list of maps on page six contains an error (195 = 203). Numbering of the maps and a table of contents for the maps and figures would have made this work more of a research tool yet no less of a show piece. A few additional pages of text certainly would not have added much to the production cost and probably nothing to the retail price.

BEADS 1:95-96 (1989)

It is to be hoped that the degree of completeness represented in the map of North America is not indicative of the completeness of the other maps. Only those tribes or archaeological cultures mentioned in the text are included, thus the Chumash represent the California Culture Area, the Yakima represent the Plateau, and the Haida represent the Northwest Coast. We are told in the caption that italics represent prehistoric cultures, yet three of the four listed are the three traditional Southwest cultures - Anasazi, Hohokam, and Mogollon. Combining the Plateau and Great Basin as the "Intermontane" is like combining the Plains and Woodlands into the "Midwest." We are also told by the map that only the Russians brought glass beads to the West Coast of North America; no mention is made of the major contributions by the Spanish, English and Americans.

The maps tend to be transitional between the illustrative material and the text in several ways. They represent in a nutshell the major weakness of this work. Dubin has attempted to do too much in too little space. The work attempts to be all things to all people and as a result opens up the text for scrutiny and negative criticism by an army of specialists. It is not the purpose of this review to go over the text page by page with a fine-tooth comb but only to point out that such an ambitious and widely based book is going to be the target of such criticism.

The book begins with a Foreword, Acknowledgments, and Introduction. The list of acknowledgements is interesting for the total lack of dirt archaeologists in the area of North American historical archaeology (only the work of Kenneth Kidd is mentioned). This is the group doing the most today with glass trade beads from all time periods in North America and the most likely to use the book as a scientific reference.

The next sixteen chapters comprise a melange consisting of chronology (The Beginnings, Antiquity [Neolithic to Roman], Europe [Late Roman to Renaissance], Age of European Expansion, The Twentieth Century); geography (The World of Islam, Africa, The Far East, India, Central Asia, Southeast Asia and South Pacific, Middle and South America, North America); function (Prayer Beads, Eye Beads); and material (The Special Beads: Amber and Pearl). All of these contain elements of the other categories but the emphasis in each is obvious.

As mentioned, it is not the objective to review all of the text, however some indication of the degree of accuracy might be gained by looking at just one small section. A colleague who would clearly qualify as an expert on one specific country sent me a critique of the five paragraphs about that country based almost exclusively on his published material. In the first paragraph the wrong site is mentioned. In the third paragraph the wrong state is mentioned, and the beads are identified as being from the country being dealt with when the published source cited lists them as similar to but probably *not* coming from that country. In the fourth paragraph a technique of manufacture is taken as assumed when the source just suggests it as a possibility. The endnote makes a statement about "beads" that should read "wound beads," thus drastically changing the cited author's findings. Finally none of the beads listed in the Bead Chart as coming from this country are actually known to be from that country and they are placed one century too early.

The text is marred by nonsequiturs ("Figure 4 is a rare star bead traded into the Spanish New World .... This bead, in fact, was found in Africa.") p. 117; errors of fact (pony beads were not used to cover entire surfaces) p. 275; speculation given as fact ("...'pony beads,' thus named because they were transported by traders on ponies.") p. 274; errors in terminology or spelling (Hudson Bay Company for Hudson's Bay Company) p. 275; and glaring omissions (*Olivella* shell beads, and historic, rolled, tubular copper beads of the Pacific Northwest). However, the text contains a vast amount of information that has been condensed with a fair degree of accuracy and a flowing writing style. The text for a specific time and place is a good beginning but must be supplemented.

The end material includes: Bead Chart: A Time Line in Bead History, Bead Chart Key, Bead Shape Table, Bead Chart Glossary, Notes, Bibliography, and Index. The chart is a tip-in, almost four pages long and printed in color on both sides. Like the text and maps, it tries to do too much in too little space. Some of the terms on the maps only show up in the chart. The Chart Key is a very useful addition and again contains information not found elsewhere in the text. The Bead Shape Table in Horace Beck's chart revisited with real beads rather than drawings. The glossary, by Jamey Allen, is tied to the chart and is excellent as far as it goes but is really too short to be useful except as an explanatory supplement to the chart.

The notes are necessary reading for those with a scholarly interest in beads but in today's world of internal citations, it is annoying to have to revert back to a system of end-notes. The Bibliography is really a references cited section and is generally very good. The abbreviation n.p. does not mean "no place" or "no publisher" as is customary, but apparently means "no pages" which translates to mean that the researcher forgot to put them down and no one went back to verify them.

In spite of some major problems with the text, the book is one that any serious bead researcher should have. The price is not surprising considering the quality of the color plates. The volume has already shown up in the discount catalogues so that even those in academia can afford to add this handsome volume to their bead library. With her demonstrated enthusiasm, excellent writing style, storehouse of knowledge, and devotion to beads, Dubin should now edit a series of volumes of contributions from the world's bead specialists.

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Beads from the West African Trade Series.

Volume I, "Chevron Beads in the West African Trade," 1986. 16 pp., 8 color plates. $10.00;
Volume II, "Tabular Beads from the West African Trade," 1986. 6 pp., 4 color plates. $5.00;
Volume III, "Fancy Beads from the West African Trade," 1987. 16 pp., 14 color plates. $7.50;
Volume IV, "White Hearts, Feather and Eye Beads from the West African Trade," 1988. 36 pp., 31 color plates. $15.00.

John Picard and Ruth Picard. Picard African Imports, 9310 Los Prados, Carmel, California 93923.

This series provides the best photographs and greatest selection of West African beads currently available in a publication. The four booklets published so far — more are planned for the future — are all extremely well-illustrated with 8-1/2 x 11 in. full-color photographs with most of the beads appearing actual size or enlarged 140 to 200 percent. Each booklet loosely concentrates on a certain category of bead, the majority of which were gathered by the Picards on trips to Africa and Venice between 1969 and 1988. Given the paucity of photographs and illustrations of West African beads, the Picards' publications are a very welcome addition to the African bead literature.

While the photographs are admirable, the quality of the volumes varies and the text often constrains the value of the work. The documentation provided in Volumes I, II and III is very brief, the Picards allowing the photographs to speak for themselves. However, the limited text, and illustrations are at times not adequate to allow for careful comparison with other specimens as the color and order of the individual layers of some of the beads cannot be determined. Colors are not given with reference to a standardized system, and no information on manufacture is provided. Because of the high quality of the photographs this information can, in many cases, be inferred, but the work would have been rendered much more useful by providing Kidd and Kidd (1983) codes or referring to some other type of classification. The first three volumes would also benefit from references or some elaboration on the basis for some of the age and source attributions.

The Picards provide little information on the context in which the beads were collected, although in several places they make some tantalizing observations. There is very little data on the distribution of bead types in Africa and the Picards' comments on the current prevalence of certain kinds in Nigeria, Mali, Cameroon, and Ethiopia are notable. The effects of 20th-century marketing and the tourist trade need to be considered, but more information on this subject would be very welcome. The ethnographic data presented about the beads is also limited. Given the great deal of myth and speculation that surrounds beads, and the great cultural variation represented in West Africa, generalizations should be avoided. for example, although chevron beads may have a preeminent position in some areas (e.g., Delarozière 1985: 69-72; Lamb 1978: 25), and they are widely found in markets, they are not one of the more ubiquitous bead types in West Africa (Picard and Picard Vol. I: 5; cf. Mauny 1957; Harter 1981). A large assemblage of beads recovered from archaeological contexts at Elmina, Ghana, included a relatively small number of chevrons of several different types. These were generally small and few have counterparts in the Picards' illustrated examples. Stories relating to the magical properties of beads are widespread in West Africa. However, old beads of African manufacture and enigmatic "aggrey" beads are more commonly accorded supernatural origins than are chevrons (e.g., Bowdich 1966: 268; Fynn 1974: 40, 65; Lamb 1976: 37; Landewijk 1970: 92; Sackey 1985: 182-185).

Although beads are clearly very important in African societies, the Picards overemphasize their role as a medium of exchange introduced by Europeans (Vol. III: 3). As noted elsewhere in this journal, beads were an important trade item long before the arrival of the Europeans on the West African coast at the end of the 15th century. Shells, iron, cloth strips, and gold were all well-established mediums of exchange in various parts of West Africa prior to European contact (Daaku 1961; Garrard 1980; 1982; Hogendorn and Johnson 1986; York 1972). After the Europeans' arrival, firearms, metal goods, cloth, cowries and other products probably surpassed the importance of beads as trade items in many areas.

Volume IV stands apart from the earlier issues. It includes five pages of text and is the most substantive in the series so far. The Picards augment their own useful observations with references to the beads in the Venetian Bead Book, Levin Catalogue, Sick Collection, Venetian Museum of Glass and other dated collections. This makes Volume IV a far more valuable research tool than previous volumes and it is hoped that future publications will reach the same standard. However, caution should be used when noting the dates attributed to the beads in the Sick Collection, some of which the Picards suggest extend into the 1950s. The Tropen Museum in Amsterdam which holds the collection maintains that it was gathered together in 1920 and that the beads on the sample cards were made before then (J.H. van Brakel 1989: pers. comm.). Further research should resolve this discrepancy.

The series as a whole provides a useful reference to beads available in West Africa during this century. Many of the beads illustrated have counterparts in 19th-century collections providing valuable comparative information. They also illustrate the continued value placed on antique beads in West African cultures and the vast array of beads produced in Europe. The average reader might be more inclined to purchase other works which provide more information on the cultural and historical background of African beads. However, the excellent photographs and the cross-referencing to other collections in Volume IV promises to make this work an important addition to the libraries of both scholars and collectors of African Beads.

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Artifacts of the Spanish Colonies of Florida and the Caribbean, 1500-1800. Vol. I: Ceramics, Glassware, and Beads.

Kathleen Deagan. Smithsonian Institution Press, Washington, 1987. xx + 222 pp., 141 figs., 8 color plates, index. $35.00 (cloth); $19.95 (paper).

The primary orientation of this publication is "to view artifacts as tools in the complex process of reconstructing and understanding past lifeways and cultural systems, ceramics, tiles, glassware and beads found most commonly on Spanish colonial sites in the circum-Caribbean region." In this respect, the data are well organized, clear, concise and presented in a manner that will, it is to be hoped, help both the layman and the professional to better understand the scientific and cultural importance that artifacts, properly interpreted, can have. As Dr. Deagan explains, "Time period, functional associations, economic activities, cultural exchange and interaction, levels of access to resources by different groups, and religion and ideology" can all be better understood through the analysis of material assemblages. "Artifacts themselves cannot address any of these issues, but can only do so in conjunction with their archaeological contexts and associations."

Sites from which samples were obtained are noted on a map, along with their approximate date ranges and are briefly described. Dr. Deagan's research actually covers the period from 1500-1820, although the terminal date listed in the title of the publication is 1800. Economic factors affecting the distribution of artifacts in Florida and the Caribbean are discussed.

The section on Spanish-colonial ceramics and ceramics from other origins found on Spanish-colonial sites includes data on coarse earthenware, Old World and New World majolica, porcelain, stoneware, Spanish-colonial tiles, unglazed tiles and bricks which were known as *ladrillos*, and roof tiles. Date ranges for these ceramics are provided.

In the section on Spanish-colonial glassware, the author discusses the manufacture of glass in Spain from the 12th century, as well as glass produced in Murano, Italy, other European glass-manufacturing centers, and Mexico. Although this information does not refer to the manufacture of glass beads, it is a source of worthwhile information for those who want to learn more about this subject.

The section on glass beads recovered from Spanish-colonial sites in the circum-Caribbean is particularly important because it provides an overview of the types present in that area over a longer time period than has been dealt with in other available reports.

Deagan points out the problems in the recovery and recording methods used on these sites over the past several decades and mentions the problem created by the inadequacy of the bead descriptions in the site reports (this is frequently the situation in reports from any area). She found that many times glass beads recovered archaeologically had been misplaced or were unavailable, and that existing descriptions were not sufficiently detailed. I have found that this situation is not limited to the circum-Caribbean region.

The author describes beads noted in documentary sources and discusses terminology used during the Spanish Caribbean period to decribe specific bead types. The use and importance of glass beads in the early trade period are also discussed.

Her section on glass-bead production outlines sources of supply and major manufacturing methods. Other bead-manufacturing techniques are mentioned but not discussed because beads made using them are either rare or nonexistent on Spanish-colonial sites.

The section relative to the classification of glass beads discusses particular bead types characteristic of the 16th-century: Nueva Cadiz, chevron, eye, gooseberry, Cornaline d'Aleppo, embroidery or seed, and heat-altered drawn. The primary sources of 17th-century beads that were available for study came from Spanish mission sites. Dr. Deagan feels that these assemblages reflect the choices of the Indians themselves or of those choosing beads for the Indian, rather than the tastes of Spanish colonists.

Table 4, providing the distribution and approximate date ranges of Spanish-colonial beads, is thorough and includes Kidd and Kidd classification codes. Dr. Deagan notes the differences in beads recovered from St. Augustine in contrast to the Spanish-mission sites. She identifies 16th-century beads that continue into the 17th century.

The striking difference between 18th-century beads and those of earlier periods in defined. At this point, available assemblages are primarily from European-occupied sites and shipwrecks. The majority of the beads, many of which are marvered, are of wound construction.

The glass-bead discussion concludes with commentary on specimens of the late 18th century, for which almost no data are available. lastly, she provides descriptions of lapidary beads present on Spanish-colonial sites: Florida cut crystal, amber, carnelian, jet, and garnet.

Both the introduction and the epilogue are important to the understanding of the significance of Dr. Deagan's findings. A useful glossary of terms that adds to the value of this work is included, as is an excellent bibliography.

It is unfortunate that Plate 8, the color plate depicting the more diagnostic glass beads, was printed upside down. In all probability, this occurred during production of the book and the error was not recognized by printing personnel, especially since there are no letter or number guides in the illustration. Had such designators been present, this problem might not have occurred; however, such guides should not be mandatory to ensure that an illustration is properly oriented in a publication! It is not difficult to relate the bead descriptions to the correct beads and readers should not have any problem with this. The color reproduction itself is of good quality and is accurate enough to allow comparisons with other specimens.

Dr. Deagan's work is most definitely worth a permanent place in a bead-researcher's library, and I expect to see it continually noted as an important and reliable reference.

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A Bibliography of Glass Trade Beads in North America.

Karlis Karklins and Roderick Sprague South Fork Press, Moscow, Idaho, 1980. iii + 51 pp., index. $5.45.

A Bibliography of Glass Trade Beads in North America - First Supplement.

Karlis Karklins and Roderick Sprague Promontory Press, Ottawa, Ontario, 1987. iii + 72 pp., index. $5.45.

For North American glass bead researchers, this bibliographic series is an essential reference. The two works contain annotated bibliographies for 1043 titles, including 455 in the initial volume and 588 in the supplement. Quoting from the most recent Introduction:

> ... this bibliography will be most useful to those seeking comparative data for the preparation of bead chronologies and distribution charts, as well as for the dating of bead collections derived from sites in the continental United States, Canada and Mexico. However, several references concerned with bead manufacturing techniques, beadwork, and the historical values and uses of glass beads have also been included. A few sources dealing with beads from areas outside North America are listed because they have a definite bearing on the study of glass beads in the New World. Excluded are reports that deal entirely with non-glass beads, Indian-made glass beads, and prehistoric beads (for these, see Buehler and Kidd 1972). Papers presented at conferences have been listed when copies of the text are known to be available from the author.

The authors conducted an exhaustive search of North American archaeological publications, including most federal, state and provincial report series; and have included references to many relevant international historical articles. Individual works are organized alphabetically, uniformly annotated, and well indexed, thus creating a highly useful comparative reference.

Entries within each volume are arranged alphabetically by author and year, with individual titles assigned unique numbers for ease of indexing. Each entry includes the author(s) name(s); year of publication or release; title; publication series; institution; place of publication; and an annotated description, usually less than 50 words, identifying the period covered by the work, the sites and political locations mentioned, and the types of beads described.

At the conclusion of the annotated bibliographic section, each volume has an index of selected terms, including specialized bead types, political locations, research subjects and temporal affiliations by century. The combination of this index with the well-structured annotations makes this series an extremely practical research tool.

I have had the occasion to use both bibliographies to identify works which potentially addressed facetted, mold-pressed bead varieties. Using indexed terms for bead types and temporal affiliations, it was possible to identify all works containing potential references to the specific bead varieties being investigated. Reviewing works in my personal library, and those available from local libraries, it was possible to check the validity of the search. Accuracy of information for individual annotations was impeccable. Although many titles proved not to have relevant information for my specific research project, the search clearly identified all works that could have contained relevant data. For this project, use of these bibliographies provided a twofold benefit: 1) they eliminated the need to duplicate a search of all manuscripts on bead research in North America, and 2) they provided precise information restricting further investigation to a few dozen relevant studies. Because these bibliographies are relatively complete, their value for comparative research is outstanding.

Also, because the scope of the series is exhaustive, it requires constant updating as new manuscripts and publications are released. As such, the authors must examine all potential sources of relevant works, a task which never ends. As the series continues, colleagues with similar research interests will increasingly provide copies of relevant titles as they become available. And as is obvious with the publication of the Supplement in 1987, new titles are being located in an aggressive and exhaustive manner. Approximately half the entries in the Supplement predate the 1980 publication date of the initial bibliography. The authors appear to be committed to the continuation of the series, with additional volumes, it is to be hoped, being released every few years. Individuals or institutions concerned with glass beads and their occurrence in North America would be well advised to include this series within their libraries, and all serious researchers would be well advised to send relevant new works to the authors for inclusion in later supplements.

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